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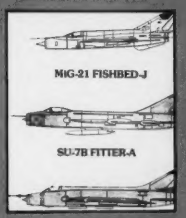

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Cover: **The wintry serenity related in our thoughts to Christmas is protected by the AH-1 Cobra, vigilant and prepared to assure that *peace* is not disturbed. "The Total REFORGER," page 2, describes the U.S. Army Aviation active and reserve forces' readiness to confront any threat to peace.**
Cover art by CW3 Craig Randall

Richard K. Tierney
Editor

The mission of the ***U.S. Army Aviation Digest (USPS 415-350)*** is to provide information of an operational, functional nature concerning safety and aircraft accident prevention, training, maintenance, operations, research and development, aviation medicine and other related data.

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Articles, photos and items of interest on Army Aviation are invited. Direct communication is authorized to: Editor, ***U.S. Army Aviation Digest,*** P.O. Drawer P, Fort Rucker, AL 36362. Manuscripts returned upon request.

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ARMY AVIATION units have been deeply involved in REFORGER (Return of Forces to Germany) exercises since January 1968 when AH-1G attack helicopters were airlifted from the United States to Rhein-Main Air Base. This year 1980 was no different as the twelfth successive REFORGER has just been completed and, as in previous years, valuable training lessons were learned.

On my visit to REFORGER '80, I was impressed by the very simple, direct and hard-work approach taken by Lieutenant Colonel Jim Sauer and the troops of the 3d Combat Aviation Battalion to the problem of decontaminating aircraft which had been exposed to an NBC (nuclear, biological, chemical) environment.

As you know, there are many approaches to the problem, depending on the unit and the equipment, but there is no fully standardized way to clean up the equipment. The tactical expedient has been to fly the aircraft "dirty," with crewmembers and maintenance people required to be in full protective gear at all times. However, eventually the aircraft must be rearmed, refueled and the flight crew must change.

The 3d's field solution, ably demonstrated during REFORGER '80, used a series of decontamination stations established near the FARP (forward arming and refueling point) entrance and manned by Soldiers dressed in full protective clothing.

At the first station, the "decon Soldiers" used a brush and a garbage can of soapy water to wash areas of the aircraft which must be handled or touched during the rearming and refueling sequence. That includes ammo bays, rockets pods, turrets, steps, doors and fuel handles. The same areas are rinsed at the second station, and then at the third one the aircraft is rechecked for contamination of the cleansed parts. If it is clean, the pilot continues to the FARP; if it is not, the sequence must be repeated.

This is an unsophisticated but hopefully effective way to approach a tough, dirty, dangerous and difficult job.

It is probably not the ultimate solution, but it does appear feasible and can be accomplished with equipment found in any unit. In sum, it gets the job done—when no other practical way may be possible.

Another important aspect of REFORGER '80 exercises was the participation of Army Aviation Reserve Component units. I was privileged to visit several and witnessed the important roles they play. In fact, my flight crews on many missions to the field were from Reserve Component CH-47 and UH-1 units deployed from Texas and Kansas specifically to fly in REFORGER '80. They did a superb job and fell right in beside their active contemporaries, demonstrating great skill and professionalism. But I'm not going to steal Captain Lynn Lanzoni's thunder. His article on that subject begins on the next page.

I am certain other Army Aviation units have devised unique and functional ideas like LTC Sauer's "garbage-can decontamination stations," or have had invaluable experiences such as CPT Lanzoni describes. It is important to share lessons learned in tactics, safety, maintenance, air traffic control and logistics—to mention a few. That can be accomplished by sending articles to the Editor, ***Army Aviation Digest,*** P.O. Drawer P, Ft. Rucker, AL 36362. We would all appreciate reading them, and Army Aviation will be a more professional—more ready force because of your contribution.

Major General Carl H. McNair Jr.
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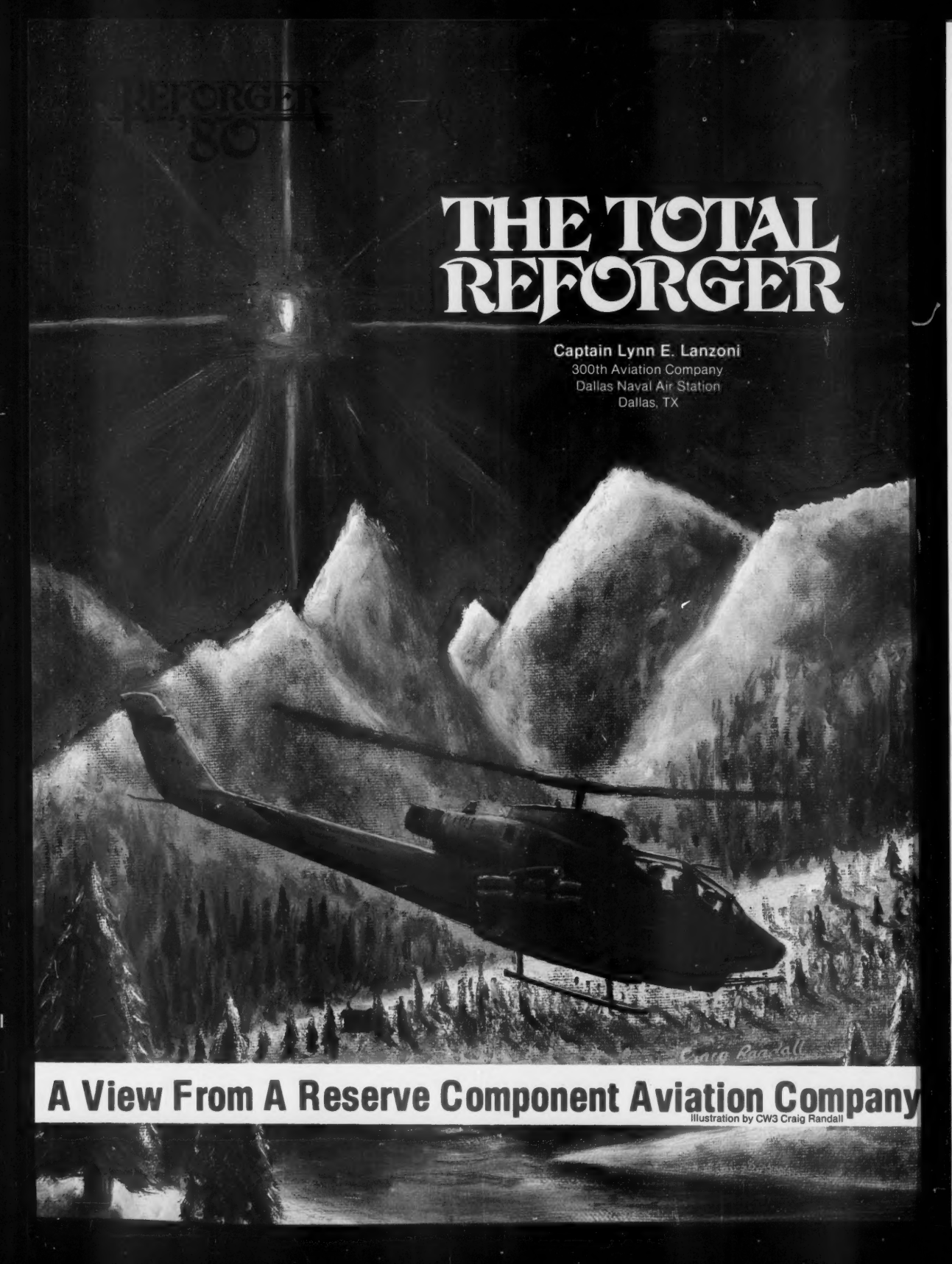

THE TOTAL REFORGER

Captain Lynn E. Lanzoni
300th Aviation Company
Dallas Naval Air Station
Dallas, TX

A View From A Reserve Component Aviation Company

Illustration by CW3 Craig Randall

MOVING THROUGH THE dark woods, eight aircrews prepare to fly aircraft that take off two by two at 0235Z for an airborne rendezvous.

At 1700Z the same eight aircrews park their aircraft home in a woodline.

In this instance, an infantry battalion was moved 25 kilometers in adverse weather and over difficult terrain. Another mission during REFORGER '80 had been completed.

What makes these eight aircrews special is that each one has a Reserve Component (RC) pilot and crewchief with an Active Component (AC) pilot and crewchief.

These aircrews represent the total Army with RC and AC aviators teaming up for support of the Return of Forces to Germany (REFORGER '80).

The RC units selected this year were the 190th Aviation Company (MED), Olathe, KS, which teamed up with the 180th Aviation Company, 223d Aviation Battalion, 11th Aviation Group and the 300th Aviation Company, Dallas, TX, which deployed and flew as partners with the 48th Aviation Company of the 223d Aviation Battalion.

REFORGER '80, the twelfth exercise in the annual series, was conducted during the period 18 August to 20 October. The exercise phase and RC concentration occurred from 14 to 25 September. During this phase, the RC units together with their AC units supported the VII Corps field training exercise (FTX), "Certain Ramparts," which took place between Nurnberg and Augsburg in the Bavarian countryside.

The FTX Certain Ramparts involved about 40,000 player personnel of whom 2,000 belonged to the Reserve Components. The 300th Aviation Company brought 110 personnel and the 190th deployed 123 to the exercise. U.S. Air Force and NATO allied personnel from West Germany and Denmark also participated in the exercise. Both Reserve Component units had the opportunity to work with these allies.

This maneuver provided a full-scale tactical environment for refining flying skills such as nap-of-the-earth (NOE), Night Hawk, instrument and a new skill, aerial mining with the M-56 system.

However, it was the challenge of using these skills in the combined arms scenario which kept the RC aircrews scrambling to keep even with their AC aircrew counterparts. There is a special irony to that situation. The AC aircrews are, on the average, young aviators, while the average RC aviators are Vietnam era veterans with about 2,000 flying hours. Many RC aviators currently fly as a full-time civilian vocation.

As it is said in Texas, not a "discouraging word" was heard about the young AC aviators. The U.S. Army Aviation Center at Ft. Rucker, AL, is producing combat ready aviators. Together, the RC and AC aircrews make a mission-ready crew.

These total aircrews demonstrated their mission readiness many times during the exercise.

After the first 2 days of flying, Warrant Officer Joe Beaver, 300th Aviation Company, said the flying is great, but, "I am so tired of U.S. Air Force A-10s buzzing me." Attacks by high performance aircraft upon the UH-1 Hueys and CH-47 Chinooks were new experiences for most RC aircrews. The airspace ceiling of 200 feet above ground level also was new for the group.

Many RC aircrews received their first checkouts in the M-56 aerial mine dispensing system that the 48th Aviation Company had in their table of organization and equipment (TOE).

"It's a simple enough system. You just line up the target between the pedals," said Major Roger D. Sims, 300th Aviation Company commander. The M-56 system and the armament section is a modification to the TOE of the AC company that the RC unit has not received.

Flying skills such as NOE and Night Hawk were part of the 48th's everyday flying which the partner

CH-47s from the 180th Aviation Company airlifted the Reserve units to and from the FTX area

Warrant Officers Susie Roberts and James Doggett make a final check on the flight route

RC shared during the FTX.

On at least one mission, these skills were shared with another RC unit working REFORGER '80. Captain Rick Carter's Special Forces team, the 11th Special Forces Group of Jacksonville, FL, was extracted after completing its mission during Exercise Carson Woods.

The 190th RC Chinook company shared flying skills with the 180th by practicing with the higher gross loads that the "C" model carries. Back in the continental United States (CONUS), the 190th flys day to day in "A" model CH-47s that have less muscle. Once the 190th got hooked on to the max loads, they began low-level flying which is a little-used skill by the 190th Aviation Company in CONUS.

"Out of the 287 hours flown by the 190th, our most interesting mission was flying representatives from the Warsaw Pact nations on a tour of the FTX," said MAJ Tom Staadt, commander of the 190th Aviation Company.

However, flying skills were not the only skills tested by the RC units. An ARTEP (Army Trainiing and Evaluation Program) task of survival, escape, resistance and evasion (SERE) was accomplished by three pilots and a crewchief. Warrant Officers Gary Campbell, Richard Brooks, John Lynn and Sergeant James Meador were taken into "enemy" territory one day at 1730 hours. Equipped with a map, an SRU-21 survival vest with basic items and a set of seven-digit coordinates for a pickup point, the aircrew was promptly inserted in front of a "hostile" position. The enemy just as promptly chased the "downed" members of the crew into the woods where they successfully evaded into the thick forests and cornfields. They crossed 10 kilometers of countryside in 2 hours. When the "forgotten four" reached the pickup point, it was dark, so they used the strobe light with flash guard from the survival vest to signal the extraction aircraft. A "hot" landing zone for extraction increased the tempo of this operation. Shortly, the rescued four were back at their unit for debriefing and a well-earned soda.

"It was a rough trip, especially with a sprained ankle received in the hovering exit and foot race," said Sergeant Meador.

Both RC organizations initiated interoperability with the AC's partnership units. The 48th/300th and the German 1st/201st Fliegergruppe exchanged aircrew strategies and each toured a major airfield of the other. The 180th/190th and the 2nd/251st Fliegergruppe exchanged aircrews on the German CH-53s.

RC Soldiers in other jobs, such as communications, motor maintenance and fuel handling practiced details of working and living in a field situation. Twice during the FTX, Soldiers practiced their work for several continuous hours under a simulated nuclear, biological, chemical environment.

Specialist Four Enrique A. Olivarez from the 300th Aviation Company, a petroleum, oils and lubricants (POL) handler who on his first trip to Germany pumped 10,000 gallons of POL in just a few days. "Coming to Germany, with all the planning and organizing we had to do, helped to prepare us for an actual mobilization," said SP4 Olivarez. He joined the Army Reserve in 1975 and says his unit is a "top notch unit . . . they're ready to go, and I sense that feeling of strength."

Of course, SP4 Olivarez is a part of the Reserve Components' strength. SP4 Olivarez, SGT Gustavo G. Hernandez, WO Monte M. McDonald, SFC Jerry W. Clenner, SGT Walter R. Bradley and PFC Wayne A. Parks were awarded Army Commendation Medals for their outstanding performance during the exercise.

Commendable performance was commonplace during the RC support to the "Certain Ramparts" exercise.

General Bernard W. Rogers, Supreme Allied Commander, Europe, praised the performance of the reservists involved in the maneuvers.

"What's encouraging to me," he said, "is to see the Reserve units and the individuals coming over here and fitting right into the pattern—immediately doing their jobs and, I think, enjoying it under different conditions than they have in training at home."

Reservists from the 190th and 300th agree with General Rogers and look forward to the challenge of again being part of "Total REFORGER" in the near future.

ABOVE: Major General Carl H. McNair Jr. (below right) is briefed in the 48th/300th TOC by AC unit commander, Major Charles Barry, on the exercise

RIGHT: Aircrews from the 48th/300th complete an air mission brief for an early morning assault

MONTHLY WRITING AWARD

Last month the author presented ideas that will help units to establish viable OPFOR training programs that define the threat. In this article he addresses the need to develop an expertise in our units to recognize and understand the equipment and military forces of *our allies*. Anyone who missed last month's issue can obtain a copy of Major Patterson's article by writing to Editor, *Aviation Digest*, P.O. Drawer P, Ft. Rucker, AL 36362.

A Tornado is a cleanser. Isn't it?
Milan...uh...somewhere in Italy, I think.
Isn't the F-16 called the Eagle?
Well it looked like a ZSU.
I thought the French had T-62s?

Whatever happened to the Spitfire?

Major Robert W. P. Patterson
Aviation Advisor
HQ, U.S. Army Advisor Group
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North Little Rock, AR

ALMOST EVERY military journal you pick up today has an article on the "Threat" or about Opposing Force Program (OPFOR) training. After too many years of diverted attention and indifference, we are making a concentrated effort to learn what we are facing in the world today. There is, however, a related area of expertise we need throughout our units that we don't presently have. This area concerns recognition and understanding of our *allies'* equipment and their military forces. Just as *our* concepts and equipment have changed, so have *theirs*.

It has been an old joke among air defense (AD) types, and as of late among attack helicopter types, to say: "We just shoot 'em all down (or up, as the case may be!) and sort 'em out on the ground." As you become involved in OPFOR training, you may find that there is more truth in that than you realize. There does seem to be a tendency (at least a stated tendency) to shoot first and ask later, if you're not certain. The underlying reason for this appears to be a basic lack of knowlege of our allies and their equipment, uniforms, etc. This is coupled with the realization that in any future conflict, we will surely be outnumbered so we need to "get our licks in early."

To illustrate this point, five attack helicopter pilots were each shown a picture of a West German "Gepard" air defense weapon, and given 10 seconds to identify it and decide if they would engage it or not. All five said they would attack it! Each pilot admitted he did not recognize the weapon, so he assumed it to be "enemy." Now in the first place, the German Army, and the Gepard crew in particular, would take a dim view of being fired upon, and should you miss, they would surely do a "number" on you with their twin 30 mm AD guns. (They are radar controlled!) Second, we have enough problems without shooting at each other, and last, we both need all the help we can get!

As humorous as this little scenario may seem in a classroom situation, anyone who has seen or heard of "friendlies" being fired upon, knows it's anything but humorous. Fortunately, there are several ways to avoid or at least reduce the chances of this occurring. To begin with, every aviator (if not every Soldier) must understand the "active defense." If you don't

know what it is, you should find out today! It is vital to understand how this concept is designed to work, otherwise you have little chance of understanding what you may see on any future battlefield. Overlap and mixing of multinational forces, enemy penetrations in certain areas, and isolated units of friendlies needing air support, are all possibilities that may well occur in the active defense.

A good knowledge of the Warsaw Pact equipment and tactics will be a great benefit because if you don't recognize what you see, you might hesitate to "confirm" what it is before you engage it. Soviet equipment is fairly well standard throughout the "Pact" nations. As an example, the T-55 tank, the Mi-8 helicopter and the MiG-21 fighter/attack aircraft are used throughout the Warsaw Pact countries.

Probably the best way to ensure you know *allied* equipment, is to *make an effort* to learn it. If you stop and think about it, it's hard to have good OPFOR without having an interest in allied equipment. At first, the idea of having to learn Warsaw Pact equipment *and* the various NATO countries' equipment may seem staggering. Indeed, there is a lot of new equipment to study, but it might be said we are "paying the price" for being indifferent so long. Once the initial shock is over, you may find the problem is not as bad as it first appeared. Most NATO countries have one main battle tank, a few primary aircraft, and a few standard missiles for antitank and air defense work. These often vary from NATO nation to NATO nation, but not always. Learn a few weapons systems and national markings, and you're on your way. Select main systems, such as primary tanks and the close air support aircraft you might expect to see, and expand from there as your knowledge grows. It's true that NATO (unlike the Warsaw Pact) has some difficulty with standardization, but on the other hand, we have many and various ways available to "skin the cat."

If you don't have a NATO or allied information training program maybe you should seriously consider beginning one. To give you an idea if the need exists in your unit, why not take the short quiz, and then give it to the flight crews in your unit?

Answers on page 18

QUIZ QUESTIONS

1. **What is the main battle tank of the British Army?**
2. **What size main gun does this tank mount?**
3. **What is the "Tornado"?**
4. **Other than the U.S., what country has "Pershing" missiles?**
5. **What is the "HOT"?**
6. **Name four countries that have accepted the F-16 to be one of their primary fighters.**
7. **What is an "Alpha-Jet"?**
8. **What is the "Milan"?**
9. **What is a "Marder"?**
10. **What is an Armbrust?**

How did you do? If you're like most of us, probably not very well, since you have likely never been trained in this area. Now is the time to learn, not when the unit is moving out. Haven't we waited long enough?

Distinctive Marking of Hospital Helipads

MEDEVAC UNITS with a Military Assistance to Safety and Traffic (MAST) support role can reduce patient en route time at night and during inclement weather operations by the use of distinctive marking for hospital helipads.

For those not familiar with MAST units, one of the main reasons we are used is that we can usually get the patient to hospital care more quickly than can ground ambulances. At times though, under certain circumstances, existing weather conditions degrade this ability to provide faster service. If the weather is bad enough, sometimes we can't go at all. What we could use is something to assist us during inclement weather so we can do our jobs as well as we can when the weather is good. Just such help is available right now and it is being used effectively in Colorado.

The city of Colorado Springs has three hospitals (Saint Francis, Penrose and Penrose Community) which are supported by the MAST unit at Ft. Carson. The administrators for these hospitals demonstrated that they were willing to support those who were supporting them by investing in heliport beacons. After the beacons were installed, the task of finding the hospital we were trying to reach became simple. Since there were only three of them and they were quite distinctive with their green, yellow and white lights flashing 30 times a minute, it became a matter of selecting one light of three, instead of one of a million.

In the past, locating the hospitals had been especially difficult when we returned from a mission at night in the mountains. Coming in from the west, the terrain drops off rapidly very close to Colorado Springs. Because of this, the transition from dark to bright city light takes place very fast. The shock of losing our night vision plus having to begin an immediate descent into that mass of lights made the task of selecting just which light was the hospital we were going to an interesting experience. Poor visibility rarely affects us there in the "Springs," but it sure is nice to see those beacons *when it is* nasty outside. We are now able to fly a more direct line to the place we are going to and this also saves a little time. It may be only a few seconds but sometimes those seconds could be critical—who knows?

The beacons that were installed proved to be quite easy to tell from military and civilian airport beacons because they flash faster and the color scheme made it hard to confuse with the lights of emergency vehicles. The result is a distinctive high visibility reference that makes us more efficient. The beacon light installation proved to be legal. A good source for information is your local General Aviation District Office which can provide the heliport design guide advisory circular 150/5390-1B to help with installation.

Getting the beacons installed proved to be much simpler than I thought it would be at first! I found that information about a beacon had been presented at the last Colorado State Air Evacuation Conference. I asked one of the people who had attended the conference about the beacon and it sounded good. Then I got a copy of the program for the conference and found the name of the person who had made the presentation. He gave me a contact from the company that produces the beacon. The point of contact is: Mike Dube, ADB ALNACO Inc., P.O. Box 513, Blacklick, OH 43003.

When I contacted Mike, he explained about the beacon and what it could do. It sounded just right for the job. I asked him to send me some information on the beacon so I could present it to the people from the hospitals to see if we could get some installed there in Colorado Springs. Little did I realize how fast

CW3 Donald E. Ambrose II
377th Medical Company
APO San Francisco 96301

HELIPORT BEACON

The "Alnaco" heliport beacon provides nighttime identification of heliports. Rotating at 10 rpm, the beacon produces 10 clear, 10 green and 10 yellow flashes per minute. The flash sequence is green-yellow-white, per FAA.

Construction is principally of aluminum castings. The shield-filter-lens assembly on each lamp head is hinged for easy lamp replacement.

The RB-3/500 uses 3-500 watt quartz halogen cycle lamps, rated at a nominal 4,000 hours lamp life. The beam intensity is 100,000 candela at the beam center. Beam width to the half intensity is 14 degrees high and 7 degrees wide.

The price is about $850. The beacon is shipped complete with filters and lamps, ready to install. Shipping weight is about 80 lbs. Photo electric cell and contactor for automatic control is optional.

The unit can be platform mounted, or pole mounted using our pole mounting adaptor kit.

things can happen when the proper people are approached at the right time. Mike sent the information I had asked for the day after I called. The timing turned out to be perfect because there was a MAST committee meeting scheduled later that month. That didn't give me an abundance of time to prepare but I managed anyway.

For some reason the committee was very receptive when I made my pitch. I had the information right there at hand, explained the problem—showed them the cure and suggested a followup visit to explain the details of how to get the beacons, where to install them and how to maintain them. They liked it! Amazing! Later that week I visited the hospital administrators for the three hospitals. One administrator controlled two hospitals. When I explained the details, he called Mike Dube while I was there and ordered two beacons to be shipped air freight. The other administrator that controlled the other hospital ordered one the next day. By the end of the month, all three beacons were up, flashing their little eyes out.

I got lucky having the people that could get the job done take an interest and act so quickly. I was surprised. It is hard to predict how people will react when presented with something like this. It worked for me—who knows—it might work for you!

SEE and AVOID

Major David F. Sale
Directorate for Investigation, Analysis, and Research
U.S. Army Safety Center

TODAY'S AIRWAYS are becoming more and more saturated with both civilian and military aircraft. In fact, between 1973 and 1978, the number of general aviation aircraft alone increased from 144,000 to 186,000. What is even more unnerving, FAA estimates that by the year 2000, civilian aircraft will approach 375,000, not to mention the increase in military aircraft. As the number of aircraft grows, so do the chances of midair collisions.

In this modern age of aviation, we have highly sophisticated computer-assisted air traffic control and navigation systems. But despite these elaborate systems, we continue to have in-flight collisions.

This is evidenced by the second worst air disaster in the history of American aviation that occurred in San Diego, California, in 1978. Most of us probably recall this tragedy. It was 0900 when a Boeing 727 was preparing to land. The pilot was at 3,000 feet under VFR conditions when his aircraft collided with a Cessna 172. A total of 137 people on board the two aircraft were killed, along with seven others on the ground. The pilots of both aircraft had received a collision alert warning from the air traffic controllers. But they failed to see each other.

Shortly after this mishap, the National Transportation Safety Board cited in-flight collisions as one of the largest problems facing aviation today. It reported that during the last 22 years, there have been 537 in-flight collisions with 1,331 fatalities.

The Army has also been plagued with its share of midairs. Over an 11-year period, the Army had 70 midairs and 241 fatalities. Many of these mishaps could have been avoided had the crewmembers been practicing the "see and avoid" concept. This is evident in the following mishaps.

- A UH-1H pilot was flying at 4,500 feet msl during VFR conditions and daylight hours.

SEE AND AVOID

About 22 miles north of an airport, the left wing of a civilian Beechcraft struck the underside of the Huey, tearing 3 feet of the wing off the Beechcraft. The Huey sustained a broken right chin bubble and severe skin damage to its underside. Fortunately, both aircraft were landed safely and there were no injuries.

- An OH-6A was on approach to a heliport when it collided with a UH-1H which was on takeoff. The main rotor blade of the UH-1H entered the OH-6A cabin, severing the lower section of the cabin and rupturing the fuel cell. The fuel from the OH-6 spilled on the Huey. Both aircraft caught fire, and the OH-6 disintegrated before hitting the ground. The main rotor blades and transmission of the Huey were torn loose before ground impact. All four people aboard both aircraft were killed.
- More recently, two OV-1 aircraft collided during formation flight. The No. 2 aircraft was directed to move up on the right side of the lead aircraft. The aircraft were flying at 180 knots and 8,000 feet under VFR conditions. While attempting to change positions, the left wing of the No. 2 aircraft struck the prop of the lead aircraft. The initial collision removed 8 inches of wing tip and 48 inches along the trailing edge. The lead aircraft began to slow down due to the loss of one propeller and struck the left vertical stabilizer of the No. 2 aircraft. The entire tail assembly separated from the aircraft. The No. 2 aircraft went into a left roll about its own axis on top of the lead aircraft, with the right engines of both aircraft striking each other. The No. 2 aircraft continued to roll while the lead aircraft pitched up and began a turn to the left as the crew ejected. The No. 2 aircraft turned right side up and began an uncontrolled nose-low dive. The crew ejected after the pilot had attempted to regain control of the aircraft. Both aircraft were total losses, but all four crewmen ejected successfully with only minor injuries.

Human side of the midair

The eyes of each crewmember play the most important part in seeing and avoiding an in-flight collision. Yet, we must realize there are many factors that affect visual acuity which place pilots in situations over which they have little control, but should be aware of.

Blind spot. The human eyeball has a blind spot where light strikes the optic nerve. The location of the blind spot for most people is about 30 degrees right of center. With both eyes unobstructed, the blind spots of each eye are cancelled out by the peripheral vision of the other eye. However, put a windshield center post or other type obstruction between the eyes and the brain cannot fill the void. Under certain conditions, a Boeing 707 would be blocked out at a distance of 1 mile and a Boeing 747 would disappear at a mile and a half.

Space myopia. Space myopia is a condition that reduces the ability of the eyes to focus due to the lack of objects to focus on. This condition can be prevalent during hazy and cloudy days where there are no mountains, buildings, etc., to focus on. A helicopter pilot will tend to focus on the rotor tip path plane while a fixed wing pilot will stare at a part of his instrument panel instead of continuing to scan for other aircraft.

Nearsightedness. The normal eye with 20/20 vision can detect an aircraft with a fuselage diameter of 7 feet from about 4½ miles away. If the crewmember is nearsighted (myopic), he will not be able to see the aircraft until it is closer. How close depends on how nearsighted the crewmember is. The more severe the myopia, the closer the aircraft will be before it is detected. If glasses are prescribed for a crewmember, they must be worn for safety's sake.

Glare. Glare overstimulates the eyes and causes a loss of sensitivity which reduces the ability of the eyes to see objects under normal light conditions. Glare may be produced from the light striking the windscreen or the instrument panel at an angle. Blinding glare can be caused by scanning, when the pilot looks directly into the sun, causing a temporary haze over the visual field.

Lack of relative motion. Lack of relative motion results in more time needed for the eyes to spot another aircraft. If an aircraft is on a head-on collision course, it will appear to be motionless. Also, if an aircraft is directly overtaking another aircraft, it will also appear motionless. An object that moves across the windscreen will be much more rapidly detected. The pilot must perform some type of evasive maneuver to cause the apparent collision aircraft to move in some direction on his windscreen.

Focusing. The time required for the eyes to change their focus from one object to another (accommodation time) is at least 2½ seconds, e.g., the time it takes to change focus from the instrument panel to outside the aircraft. This time increases with fatigue and age.

Contrast. Contrast of objects is very important in avoiding another aircraft. The aircraft that contrasts with its background is much easier to detect than one that blends in with its background, especially during low-light illumination. Sky conditions on many occasions make it much more difficult to detect another aircraft. It there is a lack of contrast, the aircraft must come closer in order to be detected, thus creating the danger of an in-flight collision.

Hypoxia. Hypoxia can affect the ability of the eyes to detect distant objects, especially at night. Due to the lack of oxygen in the blood, the eyes suffer a loss of visual acuity and have difficulty in focusing. The smoker must be especially aware of this factor. The smoker's blood is carrying carbon monoxide which displaces some of the oxygen and makes the effects of hypoxia take place sooner.

Turbulence or vibration. In extreme cases, turbulence or vibration can cause a deterioration in vision. It can also cause fatigue which further degrades the ability of our eyes and our alertness.

Central vision. At night, the eye's central vision is lost and corner vision, which is not as effective as central vision, must be used. An object must get closer to be detected.

Midair avoidance checklist

Effectively avoiding midairs takes more than just proper scanning techniques. You can avoid a midair by using the following checklist developed by the Aircraft Owners and Pilots Association. The checklist has been modified.

- Check yourself. Make sure you are physically and mentally up to flying. If you need glasses, wear them.
- Plan ahead. Study your entire route to include weather. Know what approaches you can expect at your destination. By planning ahead, your head will be out of the cockpit, scanning for other aircraft instead of studying a map or airport overlay.
- Clean windscreen. Part of your preflight should include checking the windscreen for possible obstructions. That bug you hit yesterday might get his revenge today.
- Obey the rules. Adhere to all local and federal regulations to include local SOPs. Maintain your assigned altitude and route. If you're not able to do so, advise the proper authority and get an amended clearance. Study the local area you are flying in and the area you are going to. Enter traffic as specified. Many a midair has been caused by a pilot entering a traffic pattern wrong. In most midair collisions, one of the aircraft was in the wrong place.
- Brief the crew. Brief the entire crew on proper crew scanning procedures and how to report other aircraft that should be considered possible midair threats. When identifying other aircraft, make sure you are talking about the same aircraft. Many a near miss and midair have been caused by a crewmember identifying one aircraft while the pilot was identifying another.
- Avoid crowded airspace. If at all possible, avoid areas of heavy aircraft concentration. If you must enter these areas, be well prepared by planning ahead. When navigating VFR, don't cross directly over VOR, but pass slightly to the left or right. Cross over airports at a safe altitude or, if possible, fly to the left or right of an airport.
- Know your aircraft. All aircraft have blind spots. Know the aircraft's flight limitations. If the aircraft is a low-wing type, it will be hard to detect traffic during descents.
- Talk and listen. Use your radio equipment and monitor it continuously. When approaching an airport, make a radio call from a distance far enough away to receive the local traffic situation. If the airport has radar service, call and take advantage of it. Remember, FSS will give you traffic advisories at uncontrolled airports. Once you have detected a radar target, don't forget it; yet, don't overconcentrate on it. There are many more aircraft in the area. Remember also that the primary responsibility for aircraft separation is the pilot's during VFR conditions and not the controller's. In other words, see and avoid.
- Scan. The most important item is to scan all the time. You must scan continuously where you are going and off to either side. Also, remember that most midairs occur when one aircraft overtakes a slower aircraft.

Early in the history of aviation, we found that midair collisions occurred while aircraft were close to the ground—namely during takeoffs and landings. But, regardless of what altitude we're flying, the best way to avoid this type of catastrophy is the "see and avoid" concept.

Since this article was written, two more midair collisions involving Army aircraft have occurred. There were fatalities in one collision and no injuries in the other.

What's AWOAC?

A MAJOR STEP in career planning and progression for the junior warrant officer is the Aviation Warrant Officer Advanced Course. Conception of the course goes back to June 1966 when the Department of the Army Deputy Chief of Staff for Personnel directed that a formal warrant officer career program be developed. The intent was to attract high quality personnel and offer career incentive for the warrant officer to ensure future Army requirements could be met. The United States Army Aviation Center, Ft. Rucker, AL, was tasked with the design, development and implementation of the program. Using the systems engineering approach, program of instruction (POI) development was completed in October 1967 for two courses: the Aviation Warrant Officer Intermediate Course (AWOIC) and the Aviation Warrant Officer Advanced Course (AWOAC).

The first intermediate class and advanced class commenced on 7 July 1969 and 19 August 1969, respectively. During the following 4 years, both courses remained strictly geared to aviation. In 1973 major modifications were proposed for the courses as a result of an Army review of the Warrant Officer Career Program. In January 1974 the intermediate course, while retaining its predominant aviation orientation, was redesignated the Aviation Warrant Officer Advanced Course (AWOAC). The "old" advanced course lost its aviation relationship, was opened to accept warrant officers from all branches and was renamed the Warrant Officer Senior Course (WOSC).

Now let's take a closer look at the Aviation Warrant Officer Advanced Course to answer the question, "What's AWOAC?" It was originally 22 weeks in length, but was shortened in January 1979 to 15½ weeks. Many curriculum changes have occurred during the existence of the course; however, its primary objectives have remained unchanged:

- To provide a mid-level step in the Aviation Warrant Officers' Career Development Program.
- To provide the aviation warrant officer with a working knowledge of the role of Army Aviation as it relates to the mission and function of the Army.
- To maintain a base of highly skilled and well-rounded professional aviators capable of assuming positions of greater responsibility.
- To provide career incentive to aviation warrant officers.

The AWOAC is a nonmilitary occupational specialty (MOS) producing course that graduates two classes a year. Due to the large number of students attending (about 80 to 100), each class is divided into three

FIGURE 1: PROGRAM OF INSTRUCTION

HOURS	SUBJECT
72	Management/Leadership
16	Training Management
47	Communicative Arts
4	Military Law
11	Contemporary Subjects
4	Physical Readiness Training
30	Aviation Subjects
70	Strategy
8	U.S. Air Force
66	Combat Skills
100	Elective Studies
30	Maintenance and Supply Management
42	Aviation Safety/ Accident Investigation
10	Guest Speaker Program
1	Course Critique

DES welcomes your inquiries and requests to focus attention on an area of major importance. Write to us at: Commander, U.S. Army Aviation Center, ATTN: ATZQ-ES, Ft. Rucker, AL 36362; or call us at AUTOVON 558-3504 or commercial 205-255-3504. After duty hours call Ft. Rucker Hot Line, AUTOVON 558-6487 or 205-255-6487 and leave a message

sections. The three sections are taught simultaneously with subject area blocks being rotated to obtain maximum use of instructors and classrooms. Both civilian and military instructors are employed.

AWOAC students receive training in a broad range of subject areas for a total of 511 hours of academics. The major topic areas in the current POI are shown in figure 1.

The electives listed in the POI are college courses taught three afternoons a week in the Career College by Troy State and Embry-Riddle Aeronautical Universities. Students also have the option of selecting from any of the night classes given by the universities. Two sessions are conducted by each university during the course. Students who do not have a bachelor's degree are required to take one elective each session. They are permitted to take two each session at no personal cost.

FIGURE 2: AWOAC CLASS PROFILE

Total Number of Students: 83

Total by Rank: CW3 - 22
CW2 - 61

Total By Component: RA - 12
USAR - 71

Wife Accompany - 48

Breakout by MOS: 100B (UH-1) -37
100C (CH-47) - 12
100E (AH-1G) - 30
100Q (U-21) - 4

Breakout by Career Field: IP - 30
Safety - 7
Maint - 13
Other - 33

Average Age: 31.2

Average Warrant Service: 6.7

Average Active Duty: 10.7

Past Duty Station: Germany - 23
CONUS - 34
Korea - 18
Panama - 2
Hawaii - 5
Alaska - 1

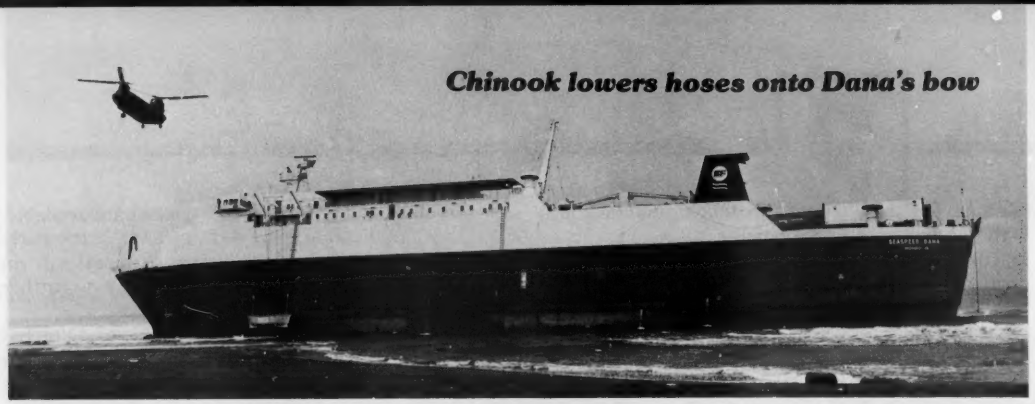
Graduate and undergraduate courses are available, and a wide selection is normally offered, particularly for the undergraduate. This program affords an excellent opportunity for warrant officers to further their education at Government expense.

Candidates for the AWOAC must have completed 3 years as either rated aviator or aircraft repair technician (nonrated). Additional prerequisites for the course are:

- Active Army or Reserve Component aviation warrant officer.
- Current in one of the following MOSs: 100B, C, D, E, R, Q, 160A.
- Possess current instrument rating that will not expire during the course.
- Obligated service for active duty warrant officer: 2 years.
- Security clearance: SECRET.
- MOS: Not applicable.

Fewer than half of those warrant officers who meet the prerequisites are selected to attend. Department of the Army selection is based on the "total individual" concept and only the best qualified or "cream-of-the-crop" are chosen. The course also may be completed by correspondence by those who prefer not to come to Ft. Rucker or those who were not selected to come. Figure 2 exemplifies the profile of a typical AWOAC class.

It is apparent from the wide spectrum of subjects incorporated in the POI that AWOAC strives for a well-rounded aviator who will be an asset in whatever assigned. How well the program succeeds in accomplishing this goal depends on many factors. One of the most important considerations is selecting what should be taught and how much time should be spent in each area. Opinions here have differed throughout the history of the AWOAC, as evidenced by the many POI changes. After all, turning out a "well-rounded" individual is not a simple task. Perhaps the most critical success factors are the attitude, interest and aspirations which the students themselves bring to the AWOAC. As the old saying goes, "You get out of it what you put into it!!"



Chinook lowers hoses onto Dana's bow

193d CHINOOK SAVES VESSEL

Story and Photos by
Colin Hale
Public Affairs Office
193d Infantry Brigade (Panama)

IT'S UNUSUAL to send a helicopter to save a ship, but that's exactly what a CH-47 Chinook of the 193d Infantry Brigade (Panama) did.

The ship, a 465-foot long "ro-ro" (roll-on, roll-off), container carrier *Seaspeed Dana,* carrying 800 tons of coffee from Puerto Limon, Costa Rica, to New Orleans, LA, ran aground at 11:45 p.m. on Sunday, 15 June.

Lying broadside onto the beach about 17 miles north of Puerto Limon and being pounded by 15-foot waves, the *Seaspeed Dana* began taking on water at an increasing rate.

Foiled in attempts to get a commercial helicopter in Costa Rica, Nicaragua and Panama, to airlift pumps to the stricken vessel, the ship's agents in Panama sought assistance from the U.S. Air Force Rescue Coordination Center (RCC) at Howard AFB. The RCC, after checking the requirements of the mission, decided to send a CH-47 from the Chinook platoon, 352d Aviation Company, 210th Aviation Battalion.

Although they had asked for 2 hours to prepare for the mission, the Chinook's crew was airborne 1-hour and 35 minutes after being alerted—no small feat since it involved installing a 600-gallon auxiliary fuel tank, fueling it and loading all the equipment for the mission.

The Chinook lifted off for the 1-hour and 40-minute nonstop flight to Puerto Limon. At this seaport town's airport, the Chinook picked up a 300-pound pump and, carrying it as a slingload, took it to the beach beside the *Seaspeed Dana.* The ship by then had a 15-degree list toward the sea.

On the beach the sling was hooked to the winch cable since it had been determined that the vessel's superstructure would prevent the CH-47 from getting close enough with the 22-foot long sling.

Then began the delicate task of maneuvering the pump, dangling 100 feet below, onto the stern of the *Seaspeed Dana.* That accomplished, Helmut Detlev, salvage master of the West German salvage company, Bugsier AG, was lowered on a jungle penetrator to the vessel's stern.

Upon returning to Puerto Limon the crew learned that a salvage tug, the *Atlantic,* with four more pumps for the *Seaspeed Dana,* would not arrive until after dark.

Dana hard aground

Puerto Limon's airport

Atlantic awaits Chinook

Salvage master drops toward Dana

Next morning, after taking on another 1,000 gallons of fuel, the Chinook flew out to the *Atlantic,* which earlier had taken up a position a couple of thousand yards offshore from the *Seaspeed Dana.*

Again with the loads dangling 100 feet below, the Chinook made five trips between the *Atlantic* and the *Seaspeed Dana,* carrying four more pumps and auxiliary equipment such as hoses and long electrical cables.

Before leaving Puerto Limon the crew learned that the pump they had delivered to the grounded ship the day before had made the difference between saving the ship and its being a total loss.

It should be noted that another tug, the *American Patriot*, which was standing by when the Chinook arrived, had made five attempts to get a towline onto the *Seaspeed Dana.* All five attempts were frustrated when the initial 1-inch line was snapped by the strong current and high seas.

Chinook's crew (from left): SSG Keith Taylor, SGT Keith Lehman, SP4 Wesley Holzhey, SSG Norman C. Schneider, CW3 Joseph L. Jones, CW3 Hugh A. Lammons and CPT Edward B. Hayes, platoon leader

VIEWS FROM READERS

Editor:

Some months ago the *Aviation Digest* published a picture of a man standing on the air intake area of a UH-1. I saw the follow-up article and request for captions concerning this "no-no."

I know (and agree) that we should not stand on the air box, or the swashplate trunnions. However, that brings up a question—if an aircrew or maintenance member wishes to inspect the M/R retention nut, how is he supposed to see it? I am of average height and surely cannot see it while standing on the approved walk area on top of the UH-1. I solicit comments from others. In the meantime, it seems we have painted ourselves into the proverbial corner.

CW3 H. D. Wright
United States Army Reserve
Rt. 1, Box 259
Chancellor, Al 36316

• The *Aviation Digest* received the following concerning CW3 Wright's letter:

The UH-1 swashplate just happens to be in a convenient spot for persons to use as a "maintenance stand" to inspect the rotor head. That's why they stand on the swashplate even though that's a No! No! How are other helicopter rotor heads (such as the OH-58) checked when there is no convenient control on which to stand? If an inspection is to be made, and very legitimate reasons for not standing on certain surfaces have been established, then it is apparent that another place on which to stand must be found, e.g., maintenance stand.

During the pilot's preflight, an adequate check of the UH-1 main rotor retaining nut can be made by even the shortest pilots while standing on an authorized spot on the cabin top. The pilot does not have a need to look at the top of the nut, only at the side to see that the locking device is secure.

If maintenance is being performed on the main rotor head, maintenance stands must be used to prevent undue weights and pressures from being applied to no-walk, no-stand areas. (See Views From Readers, page 40, of the October issue of the *Aviation Digest* for more on maintenance stands.)

Mr. J. P. Wall
Directorate of Evaluation/Standardization
Ft. Rucker, AL 36362

Editor:

In view of recent considerations to change uniform items for enhancement of morale and for other beneficial purposes, there is at least one area in which a change would be immediately welcome and . . . a great change for the better. Aviators and flight crew personnel have always prided themselves on the privilege of wearing wings—something that sets flying personnel apart from all others. Even more prestigious is the wearing of the star or wreath on the wings to indicate senior level or master/chief aircrew level. Our sister branch of service, the U.S. Air Force, has recently eased requirements for higher level flight crew wings; it would be a change for the better and a real morale enhancement if the U.S. Army would do likewise.

Until recently, Air Force Regulation 35-13 required airmen to be on flight status for at least 7 years for eligibility for senior aircrew wings, and on flight status for at least 14 years for chief aircrew wings (comparable to master aircrew wings in the Army). The very same flying longevity requirements for senior aircrew wings and master aircrew wings are still required by Army Regulation 672-5-1 for Army flight crewmembers. In a recent month, the Air Force changed the requirement for senior aircrew wings to 5 years on flight status; for chief aircrew wings the requirement is 10 years on flight status. The change resulted in no compromise of demonstrated airmanship or overall aircrew quality, but it did serve to add prestige to many flight crew personnel. It would be a beneficial change if the Army would modify the directives pertaining to senior and master aircrew wings in AR 672-5-1 in the same way that the Air Force has done in AFR 35-13 for senior and chief aircrew wings.

The requirement of 5 years on flight status instead of 7 years for senior aircrew wings, and 10 years on flight status instead of 14 for master aircrew wings would certainly not detract from the professional knowledge and overall abilities of a dedicated aircrewmember. Besides, it would give him something greater to look forward to much sooner. Furthermore, we would like to enjoy the same element of prestige as our Air Force counterparts.

SSG Frank B. Austin
Co. C, 158th Avn Bn (AH)
101st Abn Div (Air Aslt)
Ft. Campbell, KY 42223

Answers to Quiz from page 7

1. Chieftain
2. 120 mm main gun
3. A multirole Mach 2, swing wing aircraft purchased by the British, Germans and Italians. More than 800 aircraft will be built.
4. Federal Republic of Germany
5. A European built antitank guided missile (ATGM) system adopted by 10 European countries.
6. Belgium, Denmark, Netherlands, Norway and Israel among others.
7. A Franco-German produced subsonic trainer and close air support aircraft.
8. A medium range ATGM used by the British, French and Germans.
9. The outstanding West German infantry fighting vehicle.
10. Armbrust means crossbow. It is a recoilless, almost noiseless and flashless shoulder fired 75 mm antitank weapon used by NATO nations and about to be marketed in the U.S. by the Boeing Co.

AIRSPACE MANAGEMENT

Major Aubrey L. Baker

PUBLICATIONS on airspace management doctrine have evolved during the past few years from studies to draft manuals to test manuals and, finally, to completed manuals imparting firm doctrine. Having worked in and around airspace management as both an aviator and an air defender, I have followed this progress closely with some reservations as to whether or not airspace management could ever function according to the doctrine.

Until recently I managed only simulated airspace—that displayed on the airspace utilization map. During various command post or field training exercises the airspace was usually sterile of any air defense, tactical aircraft or artillery. The simulated airspace was well-managed as depicted on the airspace utilization map which was complete with minimum risk routes, standard use air routes, coordinating altitudes and safe passage routes. Since most exercises were simulated in other locations, what appeared on the map had no bearing on what was taking place in the immediate airspace outside of Division Tactical Operations Center.

What was worse, the feeling always prevailed that the Air Force, Artillery, Air Defense and Army Aviation did not really care how well the simulated airspace was managed. They were all busy simulating their air strikes, artillery fire, enemy aircraft and airmobile assaults deep into enemy territory. So when I was presented the opportunity to manage real airspace during a live joint exercise at Ft. Irwin, CA, I jumped at it.

The exercise was a combination of ground exercise conducted at Ft. Irwin by the Second Brigade "Bulldogs" of the Fourth Infantry Division (Mechanized) named "Bulldog Sarfari I," and an Air Force "Red Flag" exercise conducted at Nellis Air Force Base, NV. The Red Flag exercises are ongoing to train fighter pilots in air-to-air and air-ground tactics. The major portion of the air-ground operations is held in conjunction with the Army exercises at Ft. Irwin.

All the doctrine of airspace management came to life during a meeting at Nellis AFB where we discussed minimum risk routes, artillery warnings and coordinating altitudes. I had envisioned a coordinating altitude in the neighborhood of 500 feet. The Air Force, however, was in a different neighborhood, that of 100 feet. A quick check of the doctrine revealed: "The Air Force Component commander will be designated as the airspace control authority." So, with no buffer zone, the Army could, as a matter of routine, fly up to 99 feet and the Air Force fly down to 101 feet.

The opinions expressed in this article are those of the author and do not necessarily reflect the views of the Department of Defense.

Maybe I had jumped too soon.

To make the problem more realistic, the direct and indirect fire weapons, as well as the Air Force close air support aircraft, would be firing throughout the reservation. Included were 155 mm artillery, mortars, 105 mm tank guns, A-10 aircraft firing 30 mm ammunition, .50 caliber machineguns, 20 mm Vulcans, as well as M-60 machineguns and the M-16 rifle. Referring back to the doctrine, I interpreted the responsibility of airspace management as "assuring that friendly (and in many cases, unfriendly) aircraft could enter, depart and move within the area of operations without undue restrictions on their movements and without interfering with the effectiveness of the offensive and defensive capabilities of the joint force."

Since the doctrine states that "procedures should be as simple as possible and based on the principle of management by exception," this was followed. Prior to the exercise, maps which included a matrix overlay were distributed to both Air Force and Army Aviation units. The entire Ft. Irwin reservation was divided into matrix grids of 5 kilometers square, each with an alphabetical designator in a logical alphabetical sequence so that the northwest corner of the reservation was designated as AA, and the southeast corner as MN. Any point could then be plotted to the closest 500 meters by using the 1 kilometer grid lines and reading right and up. A typical artillery warning might consist of "artillery firing from JF43 to FH24, max ord is 10,000 feet." Since both the Air Force and Army were referring to the same system there was no need for lengthy transmissions describing firing points or six-digit coordinates.

A flight coordination center (Lighthouse Control) was established in the same building as Range Central. The original plan was to borrow the AN/TSC-61A flight coordination central and establish wire communications to Range Central; however, that piece of equipment was not available. But if I had to do it over again, I would have begged, borrowed or stolen one. As it was, an Air Force MK-107 jeep was obtained that provided frequency modulated (FM), ultra high frequency (UHF) and very high frequency (VHF) radios. A second UHF radio in Range Central was used to monitor the fighter aircraft as they flew throughout the reservation.

Having borrowed the matrix from Air Defense, the concept of the automatic terminal information service (ATIS) was borrowed from aviation. As firing occurred throughout the day, each firing was given an alphabetical designator in Sequence. Information Alpha might be broadcast by Lighthouse as artillery firing from JF43 to FH24. As firing ceased the information was "scrubbed," and by the end of the day information Bravo and Hotel may have been the only pertinent information. The same information was also passed from the airspace management element (AME) by wire to airfield operations, the Tactical Air Control Center (TACC) at Nellis AFB, and the Forward Air Control Post (FACP) on Lane Peak, just outside the Ft. Irwin reservation. Any pilot establishing initial contact with Lighthouse was able to verify that information Alpha through Delta had been received and might require no further advisories or, on the other hand, might receive information from Echo.

Doctrine further states that minimum risk routes are "recommended for Air Force use and are temporary in nature." At Ft. Irwin they proved to be so temporary in nature that those plotted at 0600 hours were no longer valid at 1200 hours. Since the fighter aircraft all entered the reservation at established entry points, it was a simple matter to route them from point to point, or by magnetic heading and distance around the artillery. Furthermore, the fighter pilots departed Nellis AFB with essentially current firing information previously passed to the TACC.

The standard use air routes remained permanent and were superimposed over the better defined roads. Although not mandatory for helicopters, the routes did provide for ease of navigation until the aviators became familiar with the area. The routes were also used on occasion by fighter aircraft; however, they were required to remain above 100 feet. Fighter aircraft also used Bicycle Lake Army Airfield as an orbit point. Rather than causing any interference, positive control was possible as the fighters were both under visual and radio contact with the tower. To avoid any conflicts between fighter aircraft and helicopters, Lighthouse broadcast the fighter route of flight and the target area. The coordinating altitude was strictly adhered to until the fighter came under the control of the ground forward air controller

(FAC) who then assumed the responsibility for keeping the aircraft clear of artillery. Helicopters flying near the target area were provided the call sign and coded frequency of the FAC to assure that the helicopter did not inadvertently become the target.

The AME was colocated with the Air Force element that operated a miniature Direct Air Support Center (DASC) and served as the point of contact for the air liaison officer as well as the ground and air FACs. Direct wire lines from the DASC to Range Central, the TACC and the FACP as well as a complete family of radios, enabled the AME to obtain instantaneous information on any activity using the airspace. Conflicts arising due to diverted aircraft or unscheduled firings were resolved immediately with a minimum of lost time or interference.

Overall, the published doctrine proved workable; however, I do take exception to that doctrine which states, "The Army command and control systems do not currently possess the capability to collect, categorize and disseminate timely artillery information with respect to intensity, duration, location and maximum ordinate of friendly indirect fires throughout the entire tactical area of operations." Granted, there will be no Range Central during combat operations; however, since artillery information is necessary for other airspace users then it is necessary to get that information out. The obvious solution is to put air traffic controllers with portable FM and UHF radios at brigade with the fire support officer. Assuming two committed brigades, four controllers could handle both the tactical air and artillery advisories for the brigade areas. Since that is the only area of the doctrine that appears to be lacking, possibly someone will be managing the airspace at Ft. Irwin in the future and place an advisory service with the brigade fire support officer. Then let's rewrite the doctrine one last time.

Major Baker was graduated from Artillery OCS in 1965. Subsequently, the author's Air Defense assignments included NIKE Hercules platoon leader, battery commander, division airspace management officer and S3 and later executive officer of a Chaparral/Vulcan battalion. Aviation duties were as rotary wing aviator for Americal Division artillery in Vietnam, aviation company commander, post aviation officer, assistant division aviation officer and S2.

Currently, Major Baker is assistant professor of military science at Niagara University, NY.

PEARL'S

Personal Equipment And Rescue/survival Lowdown

ALSE Activities

The annual U.S. Army Forces Command (FORSCOM) Aviation Resources Management Conference for 1980 was convened in Altanta, GA, during the period 24 through 27 September. A total of 166 key personnel from Army activities worldwide participated in all sessions. Safety, aircraft accident prevention and aviation life support equipment (ALSE) topics were reviewed and discussed. Among the ALSE issues considered were: problems with administering ALSE programs at the unit level; the need for full-time enlisted ALSE specialists; and the possibility of establishing ALSE technician positions in Army Reserve and National Guard aviation facilities. One item discussed in detail was the additional skill identifier (ASI) for ALSE personnel. The ASI producing course is being developed at Ft. Eustis, VA, and the program of instruction and task lists are being prepared. Graduates from the Air Force and Navy life support schools are being identified and will be automatically awarded the ASI "Q2." Personnel who have been graduated from the ALSE workshops conducted by the Army Reserve, Army National Guard or active Army also are being identified and will be awarded this ASI. ALSE training will continue at our sister services' schools until such time as the Army school gets under way.

More Key Personnel

In addition to those individuals here in the DARCOM Project Office (see PEARL, May 1980), there are many key personnel in other commands who also deal extensively with ALSE. We would like to take this opportunity to introduce you to some of those personnel within the Troop Support and Aviation Materiel Readiness Command (TSARCOM) and the Aviation Research and Development Command (AVRADCOM), all colocated with us here in St. Louis. Within the Directorate for Maintenance at TSARCOM there is the Aerial Delivery/Life Support Equipment Section, headed by Mr. Lloyd Smith. Working in that section are Messrs. Jim Dittmer, M. A. Bailey and D. B. Hopkins; they can give expert guidance if you have any specific questions on the *maintenance* of ALSE. They can be contacted at AUTOVON 693-3715, or commercially at (314) 263-3715. Also within the Directorate for Maintenance is the Combat Soldier and Base Support Systems Branch, which has maintenance responsibility for the SPH-4 flight helmet. You may contact Mr. John Rhodes or Miss Marie Kilz at AUTOVON 693-2614 or at (314) 263-2614 if you have any questions on the *maintenance* of the SPH-4.

On the R&D side of the house you will find the Development Project Office for ALSE, located within AVRADCOM's Directorate for Systems Engineering and Development, and headed by MAJ Allen Jarvis. If you have questions on any *research and development* in the ALSE area, you can call MAJ Jarvis, Mr. Dan Sabo, or Mr. Bob Matthews at AUTOVON 693-1613 or at (314) 263-1613.

This is certainly not meant to be an all-inclusive list of those personnel dealing with ALSE. You must remember that there are people in other commands such as the Communications and Electronics Materiel Readiness Command and the Armament Materiel Readiness Command—as well as DARCOM, TSARCOM, and AVRADCOM—who are striving to provide you with the best aviation life support equipment possible.

Meltdown II

In the August 1980 PEARL we told you about a melting problem with the candles contained in the cold climate survival kits. We have been informed that the candle, illuminating, national stock number (NSN) 6260-00-840-5578, now comes in a box of 12, each sealed in a small aluminum can with black tape. Unfortunately they are a bit more expensive than the old type ($35.81 per doz), but what isn't these days? As the older candles melt or deteriorate, replacement with this newer type should help alleviate the meltdown problem. Although mentioned in TC 1-62, many personnel in the field are unaware of the new candles until they receive them via the supply system. (Thanks to David A. Jarratt, 124th ARCOM AFA (27), Hamilton Field, CA, for this info.)

If you have a question about personal equipment or rescue/survival gear, write PEARL, DARCOM, ATTN: DRCPO-ALSE, 4300 Goodfellow Blvd., St. Louis, MO 63120 or call AUTOVON 693-3307 or Commercial 314-263-3307

Strobe Light Tester

This month's PEARL is holding a new item of test equipment now available for checking the strobe light in your SRU-21/P survival vest. The ACR Model TS-23 SDU-5/E test set is a self-contained and powered,

Michelle Morton
photographed by Laurence Epstein

completely portable unit, capable of checking the complete operational readiness of the light, marker, distress, SDU-5/E. It tests the strobe light for operation in a nighttime environment and simultaneously tests the flash rate by means of a digital readout for proper operation in the 50 ± 10 flashes per minute acceptance range, per MIL Specification. In addition, this test set is capable of testing the BA-1574/U strobe light battery, giving a pass/fail indication. The TS-23 test set has yet to find its way into the Army Master Data File (AMDF) but can be ordered "off-line" from the Air Force (FPZ) under NSN 6625-01-085-9669LS.

ROID It!

We receive quite a few phone calls and considerable mail from personnel in the field complaining about the receipt of ALSE items which have exceeded their expiration dates. Singled out most commonly are the batteries for the AN/PRC-90 survival radio and the SDU-5/E strobe light, as well as replacement medical items for first aid kits. This is a real problem and we don't want to minimize its importance, but it really doesn't do much good to call or write this office unless you do one very important thing: You must fill out an SF 364, Report of Item Discrepancy (ROID). Unless you submit such documentation of your problems, phone calls or letters won't do anything to alleviate an already untenable situation such as the receipt of outdated supplies. For detailed instructions on how to prepare a ROID, consult AR 735-11-2.

You Can Get It If You Want It

If anyone in the field still has an SPH-4 flight helmet with a serviceable leather-reinforced earcup retainer assembly (NSN 8415-00-411-0113 or -0114), but has been unable to get an approved chinstrap, take heed: The improved double-snap "Y" chinstrap, NSN 8415-01-045-2622, is still available. Rather than using the old single-snap chinstrap (which is strictly verboten), or replacing both the earcup retainer assembly and chinstrap with the new variety, you might simply want to get some more of these perfectly acceptable chinstraps. There is still a substantial number of the "Y" chinstraps available, and, although no longer in the AMDF, they can be ordered directly from S9T at Commander, U.S. Army Support Activity, ATTN: STSAP-SCO (Gerry Lyles), 2800 S 20th Street, Philadelphia, PA 19101. (Thanks to David A. Jarratt, 124th ARCOM AFA (27), Hamilton Field, CA, for this info.)

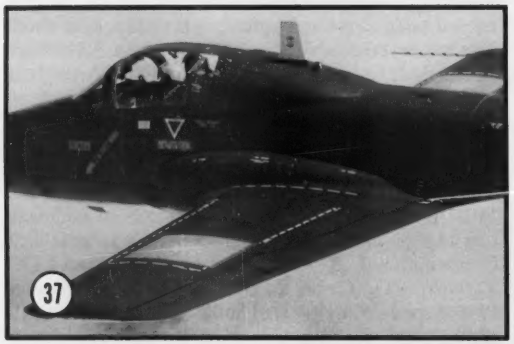
Questions And Answers

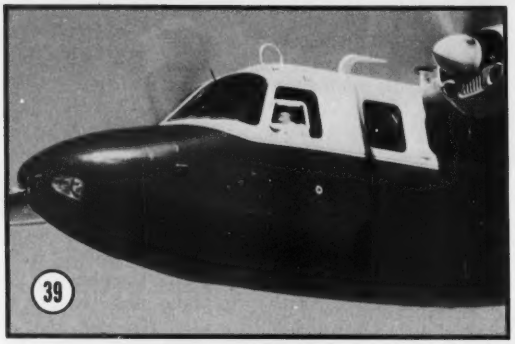
Our cold climate survival kits contain the Air Force SRU-15/P sleeping bag, NSN 8465-00-753-3226. Could you please tell us to what temperature this bag is good for? It gets quite cold where we fly during the winter, and the value of this particular sleeping bag is somewhat in doubt. (CW3 Charles Ellis, 179th Avn Co (ASH), Ft. Carson, CO)

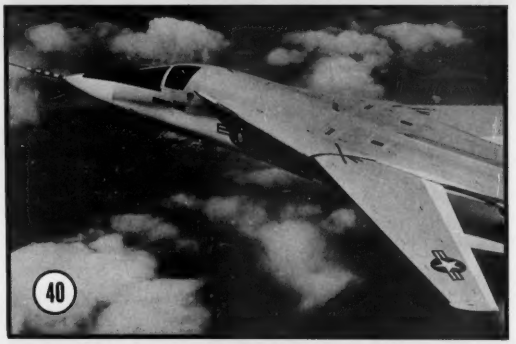
We contacted the experts at the U.S. Army Natick Research and Development Command (NARADCOM), and they informed us that the sleeping bag in question is only good down to about plus 20 degrees Fahrenheit. They also informed us, however, that a new bag has been developed and is now ready for procurement which will be good down to about minus 40 degrees Fahrenheit. As soon as a stock number is available, we will publish it in PEARL. For further information, the point of contact at NARADCOM is Mr. Bob Kelly, AUTOVON 955-2546. (Incidentally, the NSN you quoted for the bag in your kits has been replaced; the correct stock number is now 8465-00-479-1792 if you are ordering a replacement.)

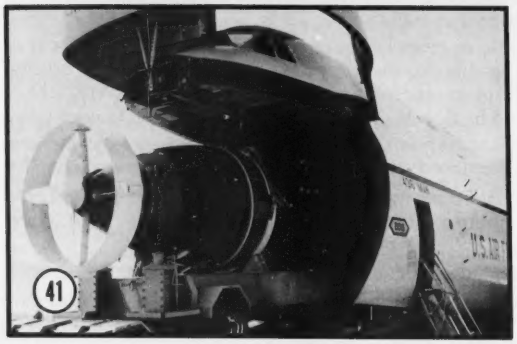
RECOGNITION QUIZ

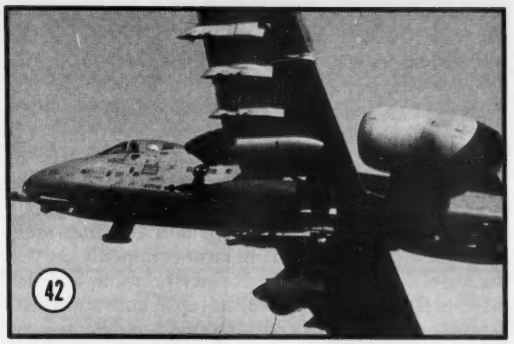
Monthly Hint For December: Two are foreign.











November 1980 Recognition Quiz Answers

31 C-12A Huron. Used by three services.

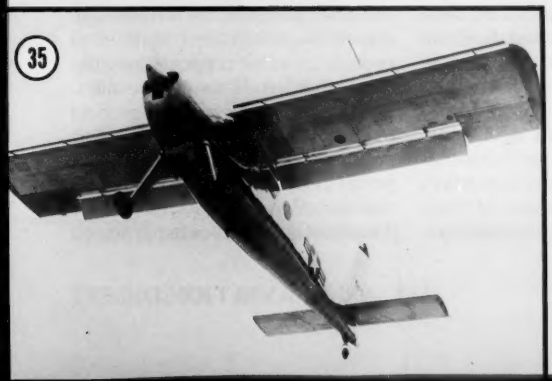
32 UV-18A Twin Otter. Located with Alaska National Guard.

33 UH-1 Huey. Backbone of airmobile combat operations in Vietnam.

34 CH-47 Chinook. Medium transport helicopter.

35 U-10 Helio Courier. Originally designated L-24.

36 Mi-10 HARKE. Russia's heavy lift crane.



THREAT

Major Frank E. Babiasz
Threat Section
Directorate of Combat Developments
U.S. Army Aviation Center
Fort Rucker, AL

Tactical Air Support Operations

RARELY DO ARMY aviators consider Warsaw Pact high performance aircraft as a major threat to Army tactical aviation in a mid-intensity combat environment. Considering past Soviet doctrine regarding missions and priority of targets for their tactical aircraft, this was probably a safe assumption.

However, the threat is constantly changing, particularly in aviation. The last few years have brought about a marked increase in the number and quality of Soviet high performance aircraft which will be routinely supporting their ground forces. Additionally, we must also remember that Soviet tactical air support includes independent helicopter regiments, which are part of the Tactical Air Army.

A Soviet Tactical Air Army (a part of the Frontal forces) is the air support available to the ground forces commander of a group of forces (i.e., Group, Soviet Forces, Germany) in peacetime or designated *Front* in wartime. A *Front* is nothing more than a tactical grouping of armies; currently, there is no U.S. comparison.

The composition of the Air Army will be dependent upon the perceived enemy threat and the zone to which it is assigned. The Army will contain fighter bomber divisions, separate regiments and service elements. Although there is no fixed organization for a Tactical Air Army, a typical structure is shown in figure 1.

In carrying out its close support mission, the Tactical Air Army uses fixed and rotary wing aircraft to execute a variety of missions to include ground attack, reconnaissance, artillery observation, transport, communication, liaison, radio electronic warfare and medical evacuation. I will address only the ground attack role, for it is this that places the U.S. helicopters and Soviet Tactical Air in close proximity.

The Soviets consider air strikes as basically an extension of their artillery fire with a strong emphasis on preplanned targets such as:

- Headquarters.
- Tactical nuclear delivery systems.
- Command and communication elements.
- Neutralization of artillery support and reserve units.

Historically, Frontal aviation was not used in the intensive close air support role although exceptions have been observed for specific operations such as:

- Mountain operations.
- Airmobile assaults.
- Hasty river crossings.
- Support of penetrations and exploitations which have outrun their artillery support.

Today, however, the Soviets have greatly improved their abilities to provide close air support along the forward edge of the battle area. First of all, the increased numbers of HIND and HIP attack helicopters have undoubtedly added to the firepower available to the ground commander. Previous articles in the ***Aviation Digest*** have clearly stated

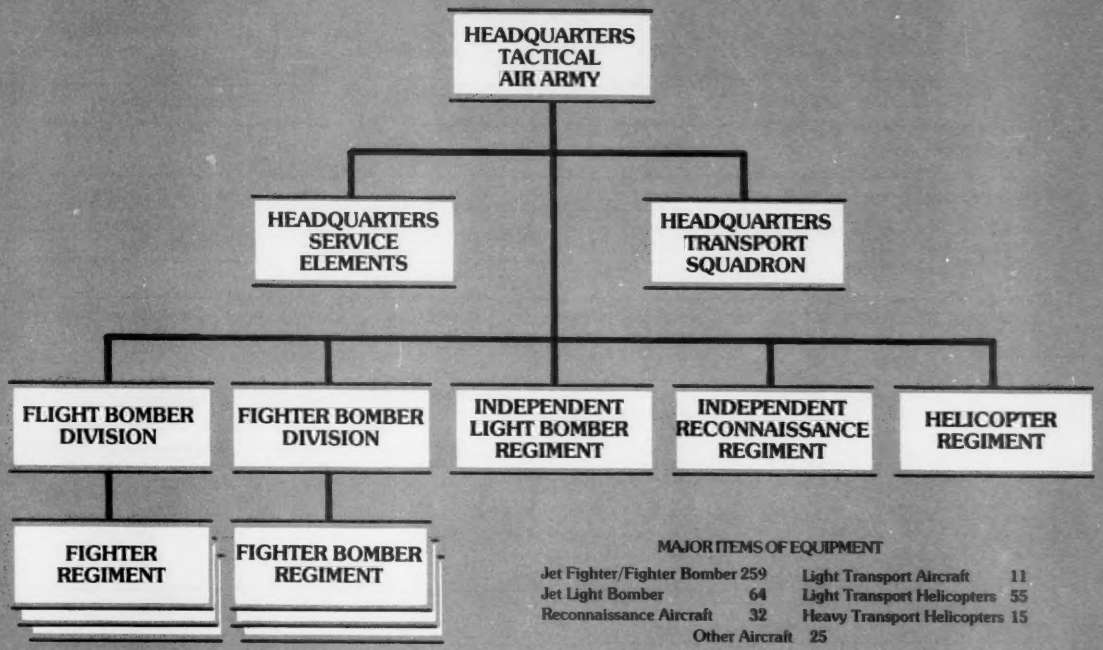


FIGURE 1: TACTICAL AIR ARMY

There is no fixed organization or size for a Tactical Air Army. That shown is hypothetical. Fighter and bomber regiments have 37 aircraft as the normal table of equipment. A division may be composed of three or more, or less than three, regiments

the threat they generate and the onboard weapons systems available. There is no doubt this part of the Air Army will play a critical part in providing close air support to attacking forces; however, a radical change in high performance aircraft has also occurred.

The traditional Soviet emphasis of Frontal aviation strictly for air defense purposes is no longer applicable. The last decade has brought about a significant change toward air attack missions as the new priority. Indications of this increased emphasis were observed with the introduction of the improved MiG-21 Fishbed capable of an increased payload in the mid-1960s. Then, in the early 1970s the SU-17 Fitter C became operational as well as the SU-19 Fencer, described as: "The first modern Soviet fighter to be developed specifically as a fighter-bomber for the ground attack mission." This swing-wing aircraft, in the same class as the U.S. Air Force's F-111, is estimated to carry in excess of 10,000 pounds of guided and unguided air-to-surface weapons and a twin-barrelled 23 mm gun. The most glaring evidence of the Soviets' increased interest in close air support aircraft was the introduction of the Flogger-D, designated the MiG-27. Although similar to the MiG-23, the Flogger-D is capable of high subsonic speed at low altitude, has five pylons for external stores including tactical nuclear weapons and air-to-surface missiles and a six-barrel 23 mm Gatling gun.

Information on a new Soviet aircraft has recently surfaced, alarming many defense experts and rightfully so.

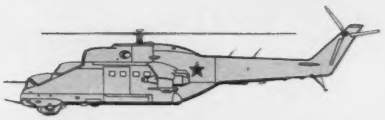
Indexes	Mi-24 HIND-A/B/D[2]	Su-7B FITTER-A	Su-17/20/22 FITTER-C[3]	Su-19 FENCER-A	MiG-21[4] FISHBED-J/K/L	MIG-27 FLOGGER-D
Year deployed	1971/72	1959	1972	1974	1968-70 1970/1977	1976
Overall length (meters)	16.99	17.37	21.65	21.28	15.76	16.8
Wingspan/rotor diameter (min/max) (meters)[5]	17.05	8.92	12.95	10.8/18.0	7.15	8.16/14.24
			Armament			
Cannons	A Model 12.7 mm MG D Model 4×23 mm Gatling guns?	2NR-30 mm guns in wings	2NR-30 mm guns in wings	1×23 mm Gsch gun and twin-23 mm guns under fuselage	J Model twin-23 mm guns	1×6 barrel 23 mm Gatling gun
Bombs	Up to 250 kg?[6]	2×750 kg 2×500 kg	2×750 kg or 4×500 kg	6×500 kg or 6×1,000 kg	250 to 500 kg; Nuclear capability	Conventional: 8×500 kg or 16×250 kg; Nuclear: 1x1,000 kg
Guided Missiles[7]	4×AT2 Swatter Missiles[8]	2×AS7 Kerry	2×AS7 Kerry	4×ASMs		4×AS7?
Maximum Range Radius, Km	350	500	700?	2,000	1,118	1,300
Rockets	32×S5 Type 57 mm hollow charge rockets pod; up to 128×57 mm rockets/ possible	4×16 57 mm rockets or 10×160 mm rockets	4×16 57 mm or 10×160 mm rockets or 4×240 mm rockets	4×16 or 4×32 57 mm rockets	57 mm and 240 mm rockets	4×32 S5/S16/S21/S24[10]

[1] Soviets appear to be developing a new ground attack aircraft.
[2] HIND-A with anhedral stub wings; HIND-B with straight wings; HIND-C is similar to A version except tail rotor is on the right side; HIND-D front fuselage redesigned to enhance gunship capability. Unlike the pilots for other types of helicopters, all HIND pilots are officers.
[3] The Su-20 and Su-22 are export versions of the Su-17.
[4] MiG-21 FISHBED-N probably export version (ground attack a secondary mission).
[5] Two dimensions used for retractable winged aircraft.
[6] Either bombs or rockets.
[7] Air-to-surface missiles only.
[8] AS7 Kerry air-to-surface missiles (6-mile range on HIND-A).
[9] 57 mm rockets can be fitted with shaped charge, fragmentation or chaff dispensing warheads.
[10] S5, S16, S21 and S24 rockets are 57 mm, 160 mm, 210 mm and 240 mm respectively.

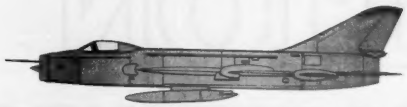
Chart courtesy of *Military Review*

FIGURE 2: SOVIET GROUND ATTACK AIRCRAFT[1]

MiG-21 FISHBED-J



Mi-24 HIND



SU-7B FITTER-A

MiG-27B FLOGGER D

SU-17 FITTER-C

MiG-17F FRESCO

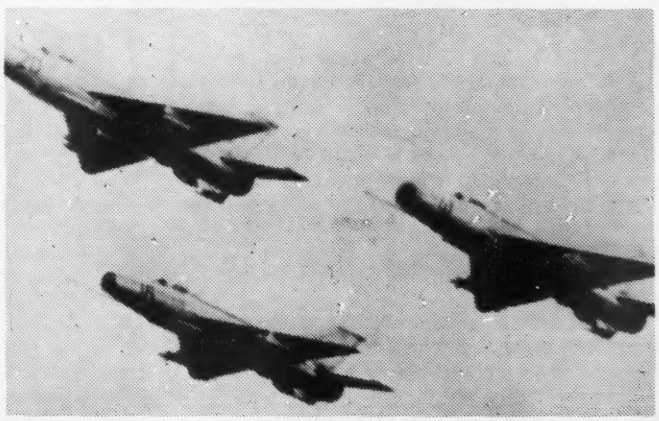
SU-19 FENCER

Yak-36 FORGER

Illustration courtesy of *Air Defense* magazine

The aircraft, which is a ground attack aircraft, is in production according to some sources. The impact of this type of aircraft operating in support of advancing Soviet armor could have a devastating effect on Army Aviation.

There can be no doubt the threat is formidable, but adherence to passive countermeasures, such as nap-of-the-earth flight, will greatly enhance the helicopter's survivability on the modern battlefield. Field Manual 1-2, "Aircraft Battlefield Countermeasures and Survivability," proposes numerous techniques which can be used to avoid detection and, if detected, maneuvers that can be used to break contact.



MiG-21 FISHBED

AVIATION
IT'S A BOOMING BUSINESS

Helen McCollough
***Aviation Digest* Staff**

DO YOU KNOW someone who wants to get into Army Aviation? Or, perhaps you may know of someone who doesn't know about Army Aviation; but would make a good Army aviator, aviation warrant officer, instructor pilot, air traffic controller, flight operations coordinator, flight simulator specialist, ground control/approach specialist or aircraft mechanic. That's great! We'd be proud to have them as a member of the aviation family.

If it's a *civilian,* tell them to check with their local Army recruiter.

But, the first thing military (enlisted and officers) need to do is check Department of the Army (DA) Pamphlet 351-4 and the following Army regulations (AR) to make sure that they meet the basic criteria and have complied with any prerequisites:

- *Enlisted* check ARs 611-85 and 611-201.
- *Officers and warrant officers* check AR 611-110.

If you still want to drive one of those flying machines make sure you possess current:

- Flight physical (Standard Form 88) (Class I or IA).
- DA Form 2 (Personnel Qualification Record).
- DA Form 2-1—Part II.
- DA Form 759 (Individual Flight Record and Flight Certificate-Army) (if applicable).

If this information is current, you're ready to submit your DA Form 2496 (with applicable inclosures) through your immediate commander to the local Adjutant General (figure 1) or Personnel Administration Center. At this point, a recommendation is made to approve/disapprove the application, and it is forwarded to Headquarters, DA, Military Personnel Center (MILPERCEN), ATTN: DAPC-OPW-P, Alexandria, VA 22331. MILPERCEN makes the final decision.

There again, if you want to become an air traffic controller—that's simple too! Just check the above regulations to see if you meet the basic criteria and prerequisites. If you qualify, forward you application (DA Form 4187 with DA Forms 2 and 2-1) through the Formal Schools Officer (at your local post) to Headquarters, DA, MILPERCEN (figure 2), ATTN: DAPC-EPT-S, Alexandria, VA 22331.

Take action TODAY! It will put you on the road to a rewarding career in AVIATION.

ARMY AVIATION

FIGURE 2

DISPOSITION FORM

For use of this form, see AR 340-15, the proponent agency is TAGCEN.

REFERENCE OR OFFICE SYMBOL	SUBJECT
Applicant's Office Symbol	Application for Army Aviation Flight Training

MEMO THRU Immediate Cdr FROM Applicant DATE CMT 1 Applicant/XX/XXXX

TO Adjutant General (Local)

1. I am volunteering for Army aviation flight training. Required information is outlined below.

a. Name:
b. Grade:
c. SSN:
d. Component:
e. Highest education (military or civilian):
f. Completed basic training (date):
g. Aptitude area GT score:
h. Fast - WOCB score:
i. ETS:
j. Weight:
k. Height:
l. Age:

2. I have no known defects that would disqualify me on class I medical.

3. I (have/have not) been: (a) convicted of any type of court (military/civil), (b) adjudged a youthful offender or (c) punished under AW 104 or Article 15, UCMJ. (If affirmative, attach a request for waiver.)

4. I (have/have not) been eliminated from a military course of flying. (If affirmative, provide total flying time accrued; reason eliminated; and date, location and nature of course.)

5. I have the following flight training and aviation experience:

a. Military rating (inclosed copy of orders and statement of military flying time -- include suspensions).
b. Civilian rating (inclose statement attesting nature of certificate, current rating and total flying time as first pilot or copilot).
c. Aircraft engineering or mechanical experience.

6. I will volunteer to extend my enlistment (AR 601-280) if I don't have 2 years remaining prior to ETS when my orders are issued to attend flight school.

7. I will volunteer to serve on active duty or in a reserve component unit for 4 years following successful completion of course.

Applicant's Name
Grade, SSN
Branch

DA FORM 1 FEB 82 2496 REPLACES DD FORM 96, WHICH IS OBSOLETE.

FIGURE 1

Photograph by Kathy Collins

AIR TRAFFIC CONTROL

PERSONNEL ACTION

For use of this form, see AR 600-1; the proponent agency is MILPERCEN.

THRU (Include ZIP Code)	TO: (Include ZIP Code)	FROM: (Include ZIP Code)
1st Bn Cdr 1st Aviation Brigade Formal School	HQDA MILPERCEN DAPC-EPT-S 2461 Eisenhower Ave. Alexandria, VA 22331	Commander 12th Co.

SECTION I - PERSONAL IDENTIFICATION

NAME (Last, First, Middle Initial)	GRADE / PAY GRADE	SOCIAL SECURITY NUMBER

SECTION II-DUTY STATUS CHANGE

The above member's duty status is changed from _____

_____ to _____

effective _____ hours, _____ 19____

SECTION III - REQUEST FOR PERSONNEL ACTION (DA Pam 600-8)

I request the following action:

	TYPE OF ACTION	Procedure		TYPE OF ACTION	Procedure
X	Service School 222-93H10	3-10		Extension (OTRA) (EM only)	4-3
	ROTC or NGUS Duty (EM only)	3-12		Excess/Advance Leave	4-8
	Deferment from Overseas	3-13		Leave to CONUS/outside CONUS	4-8
	Volunteer for Foreign Service	3-14		Officer Candidate School	4-10
	Ranger Training	3-15		Change of Name/SSN/DOB	4-11
	Reassignment Family Problems	3-16		Separation (Depn/Hardship)	4-15
	Reassignment Married Army Couples	3-32		Identification Card	4-23
	Exchange Reassignment	3-18		Identification Tags	4-24
	Airborne Training	3-19, 20		Separate Rations	5-27
	Special Forces Duty	3-22		Advancement to PV2	5-27
	On-the-Job Training	3-23		Other (Specify)	

SIGNATURE OF MEMBER (When required) DATE

SECTION IV - REMARKS (Applies to Sections II, III, and V) (Continue on separate sheet)

Request attendance at the Air Traffic Control Tower Operator Course 222-93H10. I agree to extend/reenlist to meet service obligations.

PREREQUISITES	QUALIFICATIONS
12 months remaining after completion of school	ETS-3 July 82
CT or ST 105	GT -- 110
Class 2 flight physical	See attached

SECTION V - CERTIFICATION/APPROVAL/DISAPPROVAL

I certify that the duty status change (Section II) or that the request for personnel action (Section III) contained herein--

☐ HAS BEEN VERIFIED ☐ RECOMMEND APPROVAL ☐ RECOMMEND DISAPPROVAL
☐ IS APPROVED ☐ IS DISAPPROVED

COMMANDER	SIGNATURE	DATE

DA FORM 4187, 1 May 74 PREVIOUS EDITION IS OBSOLETE. COPY 4

OPMS CORNER Officer Personnel Management System

ARMY AVIATION

Engineering/Flight Testing Program

THE ARMY HAS a continuing need to identify, select, train and assign highly qualified officers to the Army Aviation Engineering/Flight Testing Program. Aviation research and development in the Army has come a long way from the era of locally fabricated, add-on modifications to off-the-shelf aircraft dreamed up by resourceful Soldiers down in the maintenance tent. Sophisticated development programs now produce combat aircraft like the UH-60 Black Hawk and the AH-64 attack helicopter designed from scratch for Army roles on battlefields of the future. Army experimental test pilots, selected for their exceptional engineering and flying skills, play key roles in research, development and acquisition of aircraft and aviation systems. Two Army test pilots, Lieutenant Colonel Robert L. Stewart and Major Sherwood C. Spring, have been selected by the National Aeronautics and Space Administration (NASA) for astronaut training as mission specialists in the Space Shuttle Program.

Recently a selection board composed of test pilots and personnel managers convened at the U. S. Army Military Personnel Center (MILPERCEN) to consider 49 applications for the program. The board considered each applicant's professional record, academic background and flying experience, and selected four officers as "best qualified" for training at the Naval Test Pilot School. Selection by the board is the first major milestone in the arduous process of becoming an Army Aviation Engineering Test Pilot.

Test Pilot Program Prerequisites. Army aviators in grades WO1 through Captain may apply for the program. As a *minimum,* each applicant must:

- Be a rated aviator on extended active duty and qualified for aviation service.
- Be dual rated with a least 130 fixed wing hours and 1,000 hours total.
- Have completed college algebra, calculus and physics with above average grades.
- Be a confident swimmer.

Application and Selection. Officers interested should submit a letter of application to their respective assignment divisions. After considering each applicant's civilian and military education, performance record and professional qualifications, the assignment divisions forward applications with appropriate comments to Aviation Plans/Programs Branch to await board action.

Boards are held as necessary, depending on Army requirements and availability of up to nine quotas per year at the Naval Test Pilot School. Competition for the limited quotas is keen. Although boards may waive certain prerequisites for applicants whose overall qualifications mark them as best qualified, preference is given to applicants who far exceed the minimum prerequisites listed above. Completion of an engineering degree with above average grades, for example, is preferred over having only the minimum courses suggested. Experimental test pilots generally agree that the program requires mature engineers with exceptional flying skills. Extensive experience in combat aviation units is a plus.

Training. The Naval Test Pilot School (NTPS), Patuxent River Naval Air Station, MD conducts two 11-month courses per year. Once selected and prior to reporting to NTPS, Army candidates receive additional aircraft transitions (if available) to broaden their experience and versatility, and attend the Army Test Pilot Orientation Course at the U. S. Army Aviation Engineering Flight Activity at Edwards Air Force Base, CA. The 2-month orientation provides refresher academic and flight training. Academics include college

Major Jeremiah O'Fihelly
Aviation Plans/Programs
Officer Personnel Management Directorate
U. S. Army Military Personnel Center

math through calculus, physics, aerodynamics, engineering slide rule and technical report writing. Flight orientation includes high altitude environmental training, flight testing techniques and familiarization in rotary and fixed wing aircraft. Successful completion of this course is necessary to continue on to NTPS.

The Naval Test Pilot School begins one class in January and another in July. For 11 months students pursue a rigorous course of academics and flight training in one of three curriculums; fixed wing, rotary wing or systems. Army students follow the rotary wing curriculum but also receive familiarization flights in turboprop and jet airplanes in learning aerodynamic principles and flight testing techniques. An important aspect of training is not only strapping into an unfamiliar aircraft to perform a test flight, but also gathering accurate test data and preparing an effective technical report on the results of the test.

Assignments. After nearly a year of training, successful graduates can expect a 3-year utilization tour at the U. S. Army Aviation Developmental Test Activity at Ft. Rucker, AL, or at the U.S. Army Aviation Engineering Flight Activity at Edwards Air Force Base. In addition to holding Specialty Code 15 (Aviation) or 71 (Aviation Material Management), school trained commissioned test pilots ordinarily receive Specialty Code 51 (Research and Development) as their other specialty. Both commissioned and warrant officer test pilots can anticipate a balance of assignments throughout their careers between test pilot or staff research and development duties and operational unit assignments to combat aviation units to keep abreast of Army requirements in the field. The training, experience and skills of Army Aviation engineering test pilots represent a high dollar cost investment. Test pilots incur a 4-year service obligation, although the majority have remained in career status far beyond any obligated service. Their unique skills warrant careful management and use. Under the dual specialty concept of the officer personnel management system, selection for advanced schools, command and promotion will reflect how well they perform in each specialty.

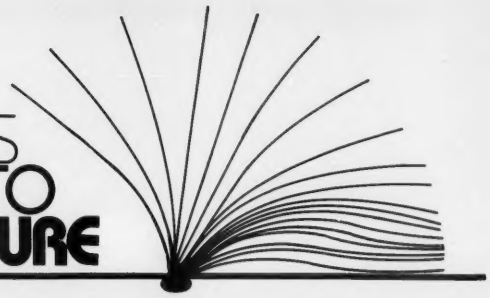
Opportunities in the Space Shuttle Program. In 1977 and 1979 NASA requested Department of Defense to nominate highly qualified personnel for astronaut training as pilots or mission specialists. Although it is not necessary to be a test pilot or even an aviator to apply for mission specialist duty, the majority of candidates selected from the services by NASA were highly qualified experimental test pilots. Both Army officers selected have extensive test pilot experience. The challenging space shuttle program, highly selective, is an alternate goal for test pilots with the "right stuff."

Should You Apply? Do you have at least the minimum qualifications? Are you interested in the design, development and acquisition of the combat aircraft of future battlefields? Are you excited by the aspect of exploring the unknown? The recent selection board considered the applications of 49 aviators who answered "yes" to those questions. The board selected four primary and three alternate test pilot candidates, held 22 applications for consideration by future boards, and returned 20 applications. In light of that, if you consider yourself qualified, contact your assignment division at MILPERCEN.

U. S. Army Aviation engineering test pilots will have a marked influence on the development of aircraft that will ensure the success of Army Aviation on future battlefields.

Major Kenneth F. Wiegand
Directorate of Training Developments
U.S. Army Aviation Center
Fort Rucker, AL

ARMY AVIATION'S NEW APPROACH TO TRAINING LITERATURE



HAVE YOU EVER been confused as to what manuals your aviation unit should have in its library of training and doctrinal publications? There are 57 manuals of all sizes, shapes and colors covering subjects from the basic elements of the atmosphere to the exact standards of the Aircrew Training Manual (ATM) Program.

If your answer to the question is "yes," it should not bother you much longer. The Directorate of Training Developments at the United States Army Aviation Center, Ft. Rucker, AL, is doing something about it.

Recent studies and feedback from the field indicate aviation training publications are too numerous and contain nonstandard and redundant material. (All of those FMs and TCs that have a series number "1" dash something are "aviation" publications and are written and produced at Ft. Rucker.) As a result, the Aviation Center's portion of the 5-year Armywide Training Literature Program has been revised to reduce its output of publications. Based on analysis of the content of currently fielded publications against identified and projected requirements for the mid-1980s, it was determined that the number of publications can be reduced from 57 to 30 (a 47 percent reduction). This reduction will be achieved by rescinding selected existing publications and consolidating others. Also, a logical subject category and new numbering system will help to establish a well-organized, easily accessible aviation library.

Four major categories were identified for all aviation-related publications written at the Aviation Center. Each category will have distinctively colored covers to enhance recognition and will be assigned a new numbering system using 100-series increments to improve overall identification (see figure).

• The first category, **EMPLOYMENT,** will contain all of Army Aviation's doctrinal employment and how-to-fight manuals.

How-to-fight manuals are specially selected FMs used with appropriate Army Training and Evaluation Programs (ARTEP). ARTEPs describe what tasks will be performed and cite required conditions and standards for their performance. How-to-fight manuals tell how to perform those tasks.

Don't confuse How-To-Fight manuals with Aircrew Training Manuals. Manuals listed in the **EMPLOYMENT** category are those which address aviation employment subjects rather than technical flight-related tasks.

• **FLIGHT,** the second category, is divided into five subcategories.

☐*Techniques And Procedures* addressing flight subjects. Series numbers 1-200 through 1-209.

☐*Aircrew Training Manuals* (self-explanatory) will have 1-210 through 1-219 series numbers.

☐*Flight Simulation* instructor guides to flight simulator use. Series 1-200 through 1-299.

☐*Meteorology* (self-explanatory) reserves the 1-230 through 1-239 series numbers.

☐*Navigation* instrument and visual meteorological navigation 1-240 through 1-249.

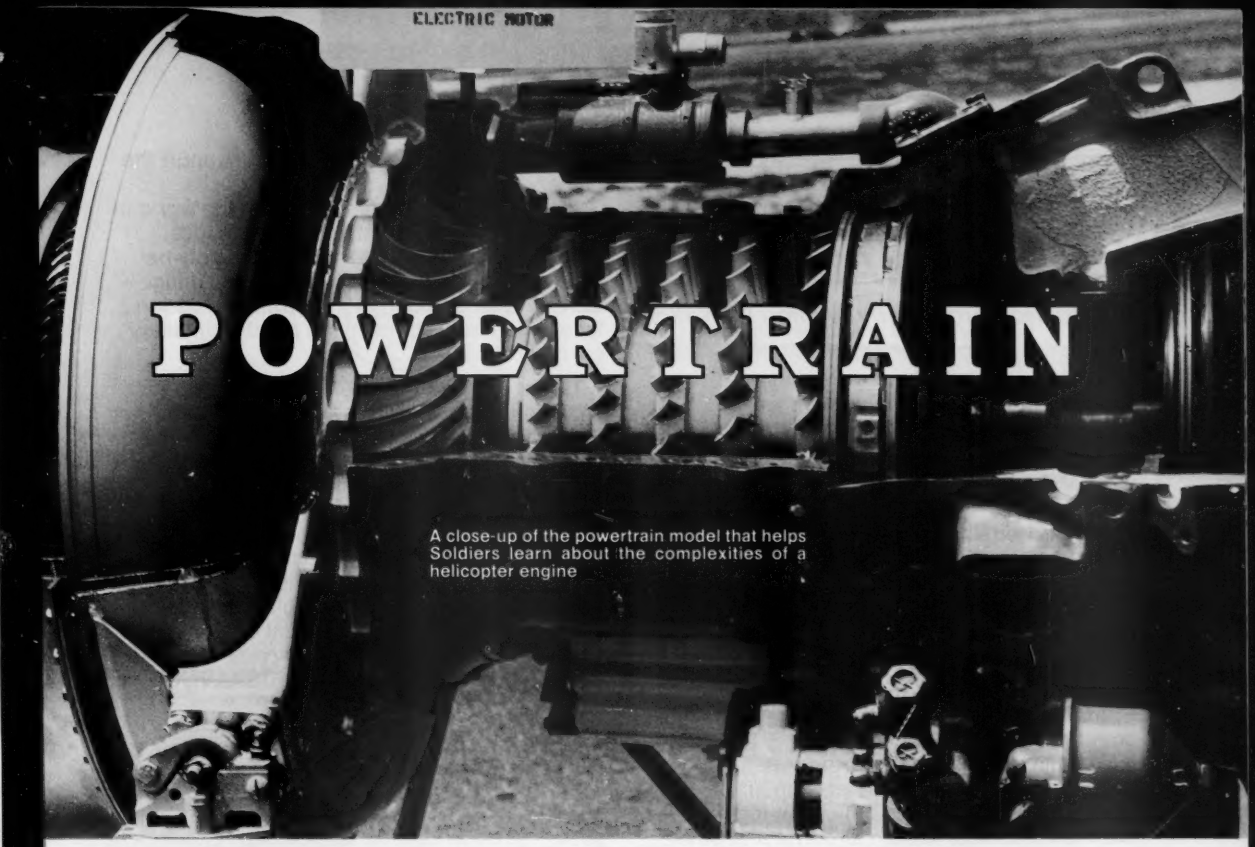
• The third major category, **GENERAL SUBJECTS,** will pertain to all **FLIGHT** and **EMPLOYMENT** support subjects like aeromedical training for aviation personnel and aviation life support equipment.

• The fourth category, **HANDBOOKS,** will be pocket-size reference publications which will incorporate specific subjects addressed in any or all manuals listed in the other categories. Their purpose highlights the most important aspects of the aviation library and provides the user with a handy reference. In this category you will find one of our "best sellers," "Aviator's Recognition Manual," (FM 1-88).

All aviation publications will be thoroughly reviewed and revised to improve readability, subject matter accuracy and reader interest.

Formulation of an *all new aviation library* is an excellent example of what the Aviation Center training developers are doing to educate today's Army aviator for tomorrow's needs. The goal is to write and produce the most interesting and valuable training and doctrinal publications in the military.

Subject Category	Color Code	Series Numbers
EMPLOYMENT	GREEN	1-100 through 1-199
FLIGHT	BLUE	1-200 through 1-299
GENERAL SUBJECTS	WHITE	1-300 through 1-399
HANDBOOKS	RED	1-400 through 1-499



POWERTRAIN

A close-up of the powertrain model that helps Soldiers learn about the complexities of a helicopter engine

WHAT DOES THE inside of a helicopter engine really look like? How does it work? These are frequent questions asked by Soldiers receiving on-the-job training as helicopter mechanics at Davison U.S. Army Airfield, Ft. Belvoir, VA.

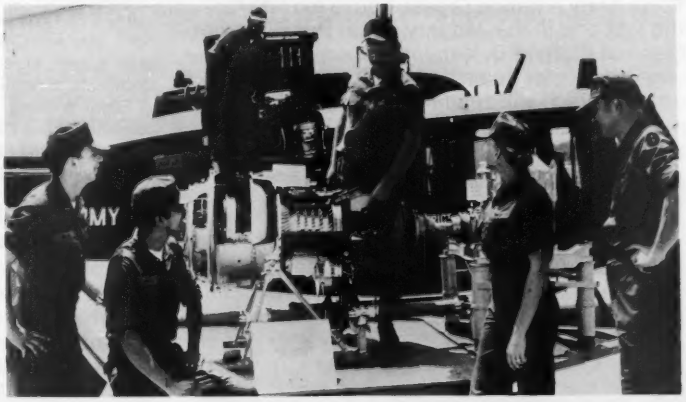
Maintenance supervisor Sergeant Raywood Dartez found an easy way to answer those and many other questions.

Taking an engine from a salvaged UH-1A Huey helicopter, he rebuilt the powertrain and mounted it on a platform for easy access and visibility. SGT Dartez then cut away portions of the outside covering so the working parts could be seen by the students.

His supervisor, Sergeant First Class Walter Cole, remarked, "Working with the model and demonstrating the various systems will teach our Soldiers more in several hours than lecturing for several days. Soldiers get most of their training on the job, and with this model they can get first-hand experience before working with the real thing."

SGT Dartez, who is on orders for Korea, summed up by saying, "It was hard work, but I wanted to leave something worthwhile behind." Also contributing to this labor of love was Sergeant Thomas Hopkins who built the frame for the model and also assisted with the welding.

Sergeant Thomas Hopkins and Sergeant Raywood Dartez, third and fourth from left, use the powertrain model to show how helicopter parts function. The model is being used at Davison Army Airfield to train helicopter mechanics (Photo by Sergeant Gerhard Bzdyr)



REPORTING FINAL

Late News From Army Aviation Activities

FROM WASHINGTON

HSM Approved. The Humanitarian Service Medal can be awarded to those who directly participated in the Wichita Falls/Vernon, TX Tornado Disaster Relief Operation during the period 10 to 21 April 1979, according to MILPO Message No. 80-20, 311809Z Oct 80. **(MILPERCEN)**

Big Money. The American Helicopter Society is sponsoring the Igor I. Sikorsky Human Powered Helicopter Competition with a grand prize of $10,000.

To fulfill the contest requirements, an applicant must build a heavier-than-air machine that is powered only by human power. The machine must remain airborne and hover for 1 minute, keep a reference point on the device within a 10-meter square, and at some time during the hover reach a height of 3 meters above the ground.

For further information, contact the society at 1325 18th St., N.W., Suite 103, Washington, DC 20036, telephone 202-659-9524. **(AHS)**

One To Go And Counting. Readers, if you have not given your topic to the DA ODCSOPS Army Aviation Officer for his monthly column in the *Army Aviation Digest,* you're too late for the first one in the January issue. But Brigadier General Richard D. Kenyon will welcome your suggestions for items he can include in future articles which will appear quarterly in the magazine. Telephone AUTOVON 227-9666 or write to HQDAMO-RQD. **(ODCSOPS)**

FROM FORT RUCKER

AUSA Speaker. Lieutenant General John F. Forrest, commanding general, First U. S. Army, Ft. George G. Meade, MD, spoke at a recent general membership meeting of the local Association of the U. S. Army chapter.

His topics included importance of the military, the real threat the United States faces, and the things that can be done to support the military.

"We live in the greatest nation in the world in resources, Government, people, attitudes, skills, in every measure that can possibly be applied," he said, adding that the only thing lacking is recognition of the threat the nation faces and the accompanying need for military preparedness.

Target Tracker. A mast-mounted sight which enables an observation helicopter to search for, acquire and track targets while masked behind vegetation or terrain was displayed to show the capabilities of the system.

Mounted on top of the main rotor of a Hughes 500-D helicopter, the sight is actually a video camera. It has the demonstrated ability to detect tactical vehicles at distances of more than 7,000 meters, transferring the image to a small TV screen where the aerial observer can monitor target movements and relay the information to other elements. **(USAAVNC-PAO)**

SAFE FLYING CITED. Lieutenant Colonel Robert R. Parks, right, talks with Chief Warrant Officer, CW3, Charles D. Flook at Ft. Rucker, AL, about the 50,000-accident-free-flying-hour Certificate of Achievement the Cairns Division, Department of Flight Training, has received. LTC Parks is the division commander and CW3 Flook is its safety officer. The training hours were logged between March 1979 and March 1980, primarily in the UH-1 Huey helicopter

FROM FORT HUACHUCA

New Patch. All members of tactical air traffic control (ATC) units will soon be wearing a new pocket patch which shows a winged shield superimposed over the U. S. Army Communications Command (ACC) globe. In the shield are the letters ATC. The globe symbolizes ACC's worldwide mission and the

new patch for ATC Units

winged shield its support to aviation.

Sergeant First Class Michael A. Mansfield, 7th Signal Command, Ft. Ritchie, MD, designed the patch which won the contest sponsored earlier this year by the Army Air Traffic Control Activity (ATCA), ACC's ATC manager. He will receive a $50 U. S. Savings Bond.

The patch will be available only in subdued colors and will be worn on the fatigue uniform. It is to be centered below the flap and parallel to the top edge of the right breast pocket.

Major General Gerd S. Grombacher, ACC commander, approved the new patch. Its initial issue will be made by ATCA and will be available later as a special request item in post exchanges. **(ACC—PAO)**

FROM FORT EUSTIS

National Title. Sergeant First Class Eugene Keller has been named the Apprentice of the Year by the National Transportation Apprenticeship and Training Conference. He earned that title in October by completing a 6,000-hour Department of Labor work program as a helicopter mechanic.

He has been stationed here since 1979 and is a CH-47 technical inspector with the Aviation Office.

During Vietnam, SFC Keller served as a flight engineer and aided in helicopter recovery. Another assignment was in Alaska as a member of the high altitude rescue team with the 242d "Sugar Bears" Aviation Company. **(PAO)**

FROM ST. LOUIS

Chinook Contract. A $103 million contract for the immediate remanufacture of nine CH-47A model Chinook helicopters to the D-model configuration has been awarded to the Boeing Vertol Company, Ridley Park, PA, by the U. S. Army Aviation Research and Development Command.

Current plans are for the remanufacture of 436 of the Army's existing fleet of A-B-C model Chinooks to the new configuration, with estimated costs over the next 10 to 12 years to be $3.1 billion. Initial deliveries are scheduled to begin in May 1982.

The modernization program, which began in 1976, is designed to increase the flexibility of the current medium-lift helicopter fleet through lowering the operating costs, extending the fleet's life, and increasing the Chinook's operational capabilities. **(AVRADCOM-PAO)**

FROM MARYLAND

For Better Hearing. The U. S. Army Environmental Hygiene Agency, Aberdeen Proving Ground, will present its annual "Military Hearing Conservation Workshop" for Department of the Army personnel from 11 to 15 May 1981.

Areas of instruction covered will be physics of sound, anatomy and physiology of the hearing mechanism, physiological effects of noise, noise measurement and analysis, hearing protective devices including practice in fitting earplugs, engineering control of noise, audiometric techniques including practice in performing pure-tone air-conduction, tests, recordkeeping, interpretation of audiograms, calibration and maintenance of audiometers, noise hazards in voice communication systems, aural rehabilitation, variables in noise-induced hearing loss, and procedures for establishing an effective health education program. **(HSE-OB/WP)**

SAFE FLYING CERTIFICATE. Robert O. Anderson, left, commander of Doss Aeronautical Services Inc.'s Flight "W," explains to Colonel Kenneth J. Burton, director of Directorate of Training and Doctrine at Ft. Rucker, AL, how his flight achieved more than 30,000 consecutive accident-free flying hours. The feat was accomplished in TH-55 Osage (pictured) helicopters between May 1976 and March 1980 in the primary phase of flight training (U. S. Army Photo by SP4 Deb Ellis)

AUTHOR RECOGNIZED. Major General Carl H. McNair Jr., commanding general, Ft. Rucker, AL, left, presents a Certificate of Achievement to CW3 Michael F. Porter, winner of the ***Army Aviation Digest*** Writer's Award for August. As author of "One Flight," CW3 Porter also received an engraved ball-point pen from the Army Aviation Center Thrift Shop

FROM CALIFORNIA

Technical Advances. Releases from the U. S. Army Research and Technology Laboratories (AVRADCOM), Moffett Field, announce the awarding of several contracts intended to advance the state of the art of rotary wing aircraft.

The interaction between a helicopter's main rotor and tail rotor will be researched by Boeing Vertol to throw more light on the aerodynamic interaction phenomena and associated penalties. Specific area of interest is nap-of-the-earth flight regime.

A tandem 2-hook beam, in place of a single hook, is being built for Black Hawk helicopter external cargo by Sikorsky Aircraft. This design allows cargo attachments closer to the fuselage, reduces cargo swinging during flight, and permits the aircraft to hover low and concealed in combat when delivering supplies.

Hughes Helicopters will design, build and flight test a helicopter equipped with a circulation control tail boom integrated with a jet thruster to provide antitorque and directional force throughout the aircraft's flight regime and to replace the tail rotor. **(AVRADCOM/RTL-PAO)**

Radar-Guided TOW. A millimeter wave radar unit has demonstrated its ability to track targets and guide missiles accurately through smoke and rain at Redstone Arsenal, AL, in an experiment conducted by Hughes Aircraft Company in a joint Army Missile

Laboratory/Defense Advanced Research Projects Agency project.

The basic TOW (tube-launched, optically-tracked, wire-guided) guidance concept was used, in which the deviation of the missile's position from the sensor's line-of-sight to the target is measured and commands are sent to the missile over a trailing wire to correct the heading. In the test flights, the millimeter wave radar provided both the target line-of-sight and the missile's position data to a specially-designed radar signal processor.

Successful launches showed that millimeter wave systems have potential for operation through smoke and battlefield aerosols with hit-to-kill accuracy. **(HUGHES AIRCRAFT CO.)**

This is the last of three articles that examine causes of spins. The previous articles, "The Flat Spin" and "Spin Awareness," appeared last month. Copies can be obtained by writing Editor, *U.S. Army Aviation Digest,* P.O. Drawer P, Fort Rucker, AL 36362. The *Aviation Digest* thanks the Federal Aviation Administration for permission to reprint this article from an FAA General Aviation Pamphlet

How to avoid the Vmc-related Accident

Stanley N. Grayson

WHY IS IT THAT accidents related to or caused by Vmc continue to make their mark in aviation accident statistics? In spite of millions of words in classrooms and cockpits throughout the world, twin-engine pilots continue to get into trouble at the low-speed, engine-out, limit control condition. What is there about this condition that makes it so hazardous? Even experienced pilots sometimes fall prey. Why can't we avoid becoming trapped in this corner of the flight envelope? Should we continue to train in this corner, or train around it? Is the information we give the pilot about Vmc the right kind? If so, why do we have so much evidence of misunderstanding about it? It is hoped that this article on Vmc will answer these questions and more.

Vmc is defined by regulatory requirement (FAR 23.149, "Minimum Control Speed") as "the minimum *calibrated* airspeed at which, when any engine is suddenly made inoperative, it is possible to *recover* control of the airplane with that engine still inoperative and maintain straight flight, either with zero yaw, or at the option of the applicant, with an angle of bank of not more than 5 degrees."

Vmc may not exceed 1.2 Vsi with:

- Takeoff or maximum available power on each engine;
- The rearmost allowable CG;
- Flaps in the takeoff position;
- Landing gear retracted; and
- The propeller of the inoperative engine windmilling, with the propeller speed or pitch control in the takeoff position, or feathered, if the airplane has an autofeathering device.

"At Vmc, the rudder forces required to maintain control may not exceed the limitations of paragraph 23.143, and it may not be necessary to throttle the remaining engine. During recovery, the airplane may not assume any dangerous attitude, or require exceptional piloting skill, alertness, or strength, to prevent a heading change of more than 20 degrees."

Sounds simple and straightforward enough, doesn't it? Well, it isn't. It is a technological web of compromise. In their desire to make a complicated condition simple and easily tested, establish a minimum level of safety, standardize test procedures and present the pilot with just one number to remember, the authorities have arrived at the above definition, essentially unchanged in the last 30 years or more. By its very longevity, it must be considered one of the better written regulations. But if it's so good, why do we still have those Vmc, Vmc/stall, Vmc/stall/spin accidents in such propensity?

Let's evaluate the above regulation and compare it with the real world:

Vmc is defined in terms of *calibrated* airspeed (CAS) while the pilot flies by *indicated* airspeed (IAS). Since the airspeed system is allowed to have a 5-knot error at 1.3 Vsi, the airspeed error at the occurrence

GLOSSARY

CCW—counterclockwise
CG—center of gravity
Cl—lift coefficient
Cn—yawing moment coefficient
CW—clockwise
F—force
FAA—Federal Aviation Administration
1x—moment arm, x axis
1y—moment arm, y axis
ISA—international standard atmospheric pressure
T—thrust
Vmc—minimum control speed
Vs—stall speed, no particular configuration
Vsi—stall speed, specified configuration
Vso—stall speed, landing configuration
Vsse—safe single-engine speed
W—weight

of Vmc can be quite large. This does not consider additional errors that may creep into the airspeed reading due to erroneous indicators, high body attitudes, slipstream effects or yaw effects. It is the rare pilot who knows enough and cares enough to analyze his calibration curves to find out where he stands with his own airplane and indicators. Luckily, however, the typical light twin has an airspeed system error of only about 3 knots at near stall speeds in straight, steady, level flight, so the problem is not as great as it may seem.

The regulation talks of "recovering" control after the engine chop. This is a slight misnomer, for the test pilot never really loses control of the vehicle. If he does, the airplane flunked that test point and he must try again at a higher speed. The test pilot "babies up" on the limit control condition (Vmc) by conducting both static and dynamic tests at safer, higher speeds and works his way down to Vmc. The test pilot must delay control application for one full second after recognition of engine failure to account for the average pilot."Recognition" is a difficult and argumentative measurement, so let's not get into that. Just rest assured that the test pilot rams full opposite rudder as soon as he can legally do so. Vmc designs the rudder on multiengine airplanes.

The regulation allows a 5-degree bank angle into the good engine. This lets the ailerons help the rudder in controlling the asymmetric yawing moment, in effect, lessening the rudder design requirement. You also are allowed a 20-degree heading change during the recovery, a concession to the dynamic nature of the test and to account in some way for the mandated 1-second time delay for the average pilot.

"Vmc *may not* exceed 1.2 Vsi" is governmentese for "Vmc *shall not* exceed 1.2 Vsi." Vmc and Vsi are both in terms of calibrated airspeed, and Vsi is the stall speed at takeoff weight, gear up, takeoff flaps, and *forward* CG, even though Vmc is tested at *aft* CG. This is one of those little "built-in" wrinkles in the regulations, and allows Vmc to be slightly higher than if the aft CG stall speed was used. (To our knowledge, no FAA region has interpreted this ruling to include lightweight takeoff, which would reduce the maximum allowable value of Vmc still further.)

The regulation limits rudder forces to 150 pounds during the test, the typical airplane requiring very near limit. FAR 23.143 allows temporary forces of 75 pounds, 60 pounds and 150 pounds for pitch, roll and yaw, respectively. Prolonged forces are 10, 5 and 20 pounds.

The regulation prohibits dangerous attitudes in the *recovery,* but does not address the unusual (if not dangerous) attitudes extant at Vmc *entry* in today's aircraft, which generally have a high thrust-to-weight ratio.

Nothing is mentioned about airplane performance. All the regulation guarantees is that the wings will be level at impact 20 degrees off the runway heading. This assumes you have average alertness, skill, strength and use full opposite rudder quickly and effectively. That's not much hill for a stepper, is it? "Skill and Alertness" are basically judgment items in spite of several attempts to quantify them by different institutions.

Now that we have evaluated the Government's viewpoint on the subject and discussed some of its pitfalls, let's dissect Vmc from a technical viewpoint, remembering that it is the critical design condition for multiengine airplanes with laterally positioned engines. "Push-Pull" centerline thrust installations are excused from this classroom.

The yawing moment created by asymmetric power T x ly is illustrated by figure 1. It must be offset by an opposing yawing moment, F x lx, created by deflection of the rudder. For positive control, the yawing moment of the rudder must be greater than the asymmetric yaw.

When all this is put in coefficient form (engineering terms), the resultant plot looks something like figure 2. Notice that the yawing moment coefficient, Cn, is constant for a fully deflected rudder, but the rudder *power* required goes up as speed decreases. If the other engine were failed, essentially the same curve would result, but Cn would be negative.

From the figure, point "A" denotes Vmc, and all speeds below that are out of control by definition. If this speed is too high, or the rudder forces too high, then the rudder must be made larger, or boosted controls must be used, or power must be reduced to bring everything back into proper balance.

That is the story in a nutshell, but let's throw in a few acorns, for the above textbook theory has a few bumps in real life:

- The thrust output is not constant, going up and down like a yo-yo with temperature, altitude and power setting. So really, position "A"in figure 2 represents only one condition in a whole family of curves. But supposedly it is the most critical (highest power) condition. It is the only number published in most flight manuals.
- We don't know if the airplane would have a positive climb gradient at point "A" with an engine out and fully deflected rudder. In many cases, it will not.
- As the airspeed gets slower, the rudder power required gets extremely sensitive, and a 5-knot error in the airspeed system in the wrong direction could put you on the short end of control.
- The location of the stall speed relative to point "A" is another control consideration, for if the airplane is stalled just at Vmc attainment, you've got a real handful from a control standpoint. Of course, this is highly dependent on the stall characteristics. An airplane with good stall characteristics can be readily controlled even at Vmc, but

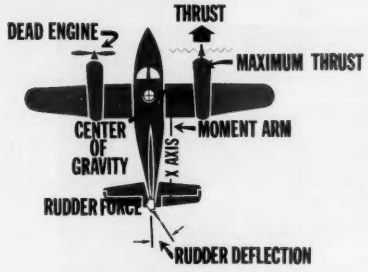


FIGURE 1: Yawing moments due to asymmetric power and rudder deflection

in one with poor stall characteristics, look out!

Also, Vmc is always at low speed, near the stall, at high coefficients of lift, where large aileron deflections combined with the resultant roll and the inclination of the lift vectors create yawing moments that add to the asymmetric yaw. In sum, mixing stalls, roll and high amounts of asymmetric yaw are inductive toward spins. FAA uses this to promote conducting spin tests on twin-engine airplanes, but the negative effects that spin test requirements would have on airplane design can be avoided by providing good stall characteristics, plenty of rudder power and good training.

• The windmilling drag of the dead engine is a function of blade angle, rpm, engine rotational inertia, airspeed and angle of attack. Normally, the windmilling drag is ignored in computations, but certain installations produce high drag, thereby increasing the rudder power requirements still more.

Also, the failure is always considered to be the engine itself—what if a propeller goes into reverse pitch while the engine is running? Vmc just went up a bunch! A corollary to this is the story about the four-engine turboprop that ingested birds on takeoff, losing two engines on one side of the airplane. The rudder power was inadequate to handle this much yawing moment—the airplane being below two-engine Vmc—and the aircraft went out of control and crashed. Determination of two-engine-out Vmc on four-engine airplanes is not a requirement of the FARs.

Let's now look at some peculiarities caused by the propeller rotational direction. From figure 3, the most critical asymmetric yaw is shown for three twin-engine configurations. The reason the centerline thrust vector shifts around is due to a phenomenon called "P" factor; for example, the downgoing propeller blade has a higher angle of attack relative to the actual direction of the airflow through the prop, therefore a higher Cl than the upgoing blade when the airplane is at high angles of attack. This moves the center of thrust to the right on aircraft with clockwise turning engines (3a) when viewed from the rear. The highest asymmetric yaw occurs on this configuration when the left engine fails. On aircraft with counterclockwise turning engines, a right engine failure is most critical (3b). With counterrotating propellers; for example, one CW on the left and one CCW on the right, the asymmetric yaw is greatly reduced and it is immaterial which engine fails for asymmetric yaw is the same, left or right, all other factors being equal (3c).

Another very critical factor affecting Vmc is the affect of altitude on the power available from the operating engine. As altitude increases, power available from a nonturbocharged engine *decreases* and this decrease in power results in a corresponding decrease in asymmetric forces and therefore a decrease in Vmc. Thus there is an infinite number of speeds at which Vmc may occur.

Now think about what happens as the weight of the aircraft varies, flap positions are changed, the CG is shifted or the rigging is adjusted. Each of those things affects the stall speed. So here we are in an airplane with a constantly changing stall speed and a constantly changing Vmc. Yet we must be extremely cautious to never, *ever,* let the two occur simultaneously. The control problems at the point at which the Vs and Vmc curves cross are likely to be severe, beyond the capability of almost any pilot.

But, the minimum control speed as a function of power setting normally will not be found in the handbook, so there is no readily available way for the poor pilot to ferret out the dangerous intersections of those stall and Vmc curves. A test required by FAA that basically investigates this problem is one engine-inoperative stall characteristics with 75 percent maximum continuous power on the operating engine. This investigates the handling of the airplane when Vmc and stall are very close together, even though they may not be overlapping each other.

Psychologically, then, what have we presented to the pilot when we give him Vmc based on the highest engine power? Not much help, that's what.

Certainly, if the pilot always stays above the published Vmc, there is little that can happen to him in the way of control difficulty (engine out). Most manufacturers are now relying on a new number, Vsse, safe single-engine speed. This is a speed above Vmc, apparently selected by the manufacturer based on his own data. This is fine, but what is wrong with providing a chart of Vmc as a function of horsepower? It's easy to come by and would provide the pilot with one more piece of information that, if used intelligently, could help him avoid the Vs-Vmc overlap problem. This would be especially good for instructors during training operations.

This brings us to the crux of this presentation. It is a good bet that the vast majority of accidents related to Vmc occur during the training situation. In other words, we are trying to prevent accidents by giving demonstrations of accidents. The result has been that too many very experienced pilots have been involved in the Vmc accidents in airplanes

that were not troublesome from a controllability viewpoint. It is clear that these happen for one or more of the following reasons:

- Complacency or overconfidence on the part of the instructor.
- Too much reliance on aileron, not enough on rudder.
- "The other guy's got it" syndrome.
- *Too much reliance on aileron, not enough on rudder.*
- Seat adjusted improperly to reach full rudder.
- *Too much aileron, not enough rudder.*
- Being "timid" on the controls in order to appear a "smooth" pilot, or failing to apply the full rudder force necessary. A rudder push of 150 pounds is a lot more than you think.
- *Too much aileron, not enough rudder.*
- Vague understanding of adverse yaw, sideslip affects on low-speed operations.
- *Too much aileron, not enough rudder.*
- Repeated operation in a critical control condition.
- *Too much aileron, not enough rudder.*
- Anticipating which engine will be cut.
- *Too much aileron, not enough rudder.*
- Wrong engine, switch, feather control and so forth actuated.
- *Too much aileron, not enough rudder.*
- False sense of security about airplane performance.
- *Too much aileron, not enough rudder.*

If you get the feeling we think most pilots have forgotten (or never knew) what the rudder is for, you're right. Too many pilots "steer" the airplane with aileron while their feet are resting comfortably on the floor. They also "baby" the airplane a distracting amount instead of aggressively making it do what they want it to do. If you do not command the airplane, it will command you, especially engine out. It's guaranteed you will be hip deep in trouble if you don't learn to use the rudder—authoritatively, promptly and defensively. A timid rudder application during a real engine failure will result in a wipeout—probably yours.

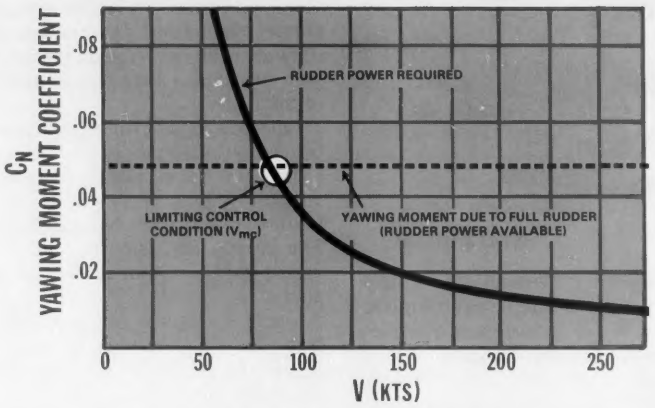


FIGURE 2: Limit condition in coefficient form

In regard to horsepower, the current light twin is a different feline from the cat that existed a generation ago. Thrust-to-weight ratios have doubled, which means flight path angles have also doubled. Pour the throttle to both engines on a typical twin today—and hold an airspeed near Vmc—and you'll find yourself looking at 30 degrees or more pitch attitude. The instructor who dynamically chops an engine on a green student at that point is asking for trouble. Years ago, an engine chop at Vmc was more manageable, but it was dangerous even then. The new thrust-to-weight ratios make it imperative that a way be found to train around making the full-blown Vmc demonstration. That will be considered blasphemy by many, but the accident statistics speak for themselves. Instructors repeatedly take students to the limit control condition and too often a disaster results.

One last word on the engine-out condition. Some handbooks have single-engine go-around procedures in the emergency section. Some of these imply that the go-around can be initiated at any time, any height and with the gear and flaps extended. However, the truth is no performance chart exists for single-engine performance with the gear and flaps hanging. Therefore, when you are operating in that situation you are in an area of unknown performance, and you quite likely cannot make a successful go-around.

An example is taken from the flight manual of a well-known light-twin turboprop that has a single-engine go-around procedure. From the balked landing (two engine) climb chart, 2,000 feet altitude, ISA + 20 degrees C, 8,200 pounds weight, we find that the rate of climb equals 1,350 fpm. From the engine power charts we find the shaft horsepower available. Reducing that for an 80 percent efficient propeller (assumed) we find the thrust horsepower available. Through some mathematical trickery, learned at great expense, the drag is found to be the equivalent of 482 thrust horsepower at the recommended speed.

But alas, the full takeoff power available with one engine out is only 436 thrust horsepower. This does not count the drag of a windmilling

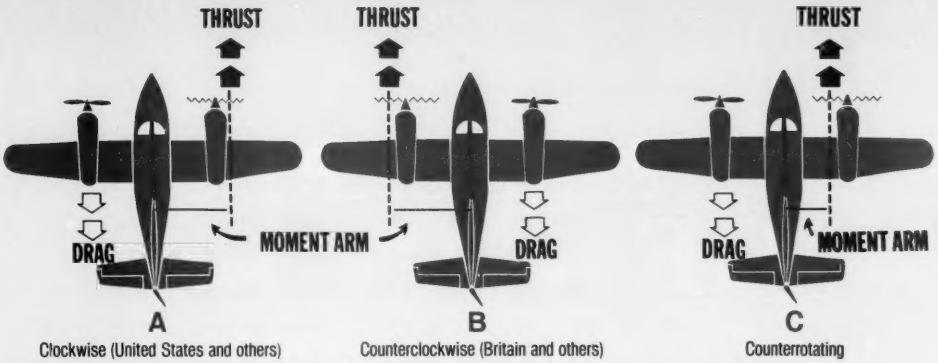


FIGURE 3: Effect of engine rotation direction

propeller or the yaw drag due to asymmetry. So our unsuspecting pilot puts full power on at 50 feet to initiate a go-around and finds himself still sinking. He can't pull the gear up because he's afraid he will belly it in and he knows better than to pull up the flaps at such a precarious altitude, so he pulls the nose up, approaching Vmc. A half mile or so down the runway, our pilot is faced with landing as is or losing flight control. In essence, he lost control when he initiated the go-around.

The moral of this story is: Do not attempt a single-engine go-around unless you have sufficient altitude to get the gear and flaps up and attain a condition of known performance. This usually takes 300 to 400 feet terrain clearance.

At the beginning of this article, some questions were asked that, by now, you probably can answer from the text already presented. Several steps could be taken by the industry and FAA that would greatly reduce Vmc-related accidents, while improving the flying qualities of the typical airplane. These are:

- Change the low airspeed accuracy standards from ±5 knots to ±4 knots, which is essentially the same error allowed years ago when it was expressed in the former statute mile unit as ±5 mph.
- Apply the above airspeed accuracy standards down to 1.2 Vsi in the takeoff and cruise configurations, and down to 1.2 Vso in the landing configuration. These steps would assure accuracy nearer the critical control speed. System variations due to weight, attitude, power setting, asymmetric power and yaw should be investigated during flight test and described to the pilot in the flight manual. This, we think, is a reasonable request; anything that biases the airspeed, the pilot should know about.
- Standardize all charts, placards and airspeed indicators into knots and degrees Celcius (Centigrade). Ban airspeed indicators marked in two units of speed. (Nuts, sales—it's knots.)
- Reduce the maximum allowable Vmc from 1.2 Vsi to 1.15 Vsi and do away with 5-degree bank angle concession, Vsi should be at takeoff weight and flaps, *forward* CG. All this would result in more powerful rudders.
- Reduce the maximum allowable rudder force from 150 pounds to 135 pounds. This would enhance the probability of full rudder application by the average pilot.
- Provide a chart of Vmc as a function of horsepower, shaft horsepower, or thrust, as appropriate, for the range of altitudes and temperatures the aircraft is certificated to operate in.
- Provide docile stall characteristics.
- Do not go looking for trouble by conducting training at Vmc. Stay 5 to 10 knots above the actual critical control case. If Vs and Vmc are near one another, change the asymmetric yaw situation to separate them.
- Drill students on use of the rudder. It is not just a device to keep the ball in the center. It is the yaw control. Use it!
- Record the altitude lost in transitioning from 1.3 Vso (gear and flaps down, maximum landing weight) to 1.2 Vsi (gear and flaps up, one engine inoperative). The power on the operating engine should be the maximum continuous power appropriate for ISA + 20 degree conditions at 2,000 feet altitude. This number should be published in the flight manual as a barometer of airplane go-around capability.

Many will think the above is just the raving of a frustrated rulemaker, but the things outlined would improve engine-out safety, increase the capability of the pilot to control the airplane and reduce confusion due to nonstandardized charts. Some of these suggestions could be done voluntarily by manufacturers or instructors and implemented almost immediately.

The increased rudder power could, and should, come along on the next airplane design, for that's what this whole thing boils down to—*we need more rudder.*

THE HAZARDS OF NOISE

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WHAT DOES NOISE have to do with safety? Why should we be concerned with its effect on us? Can we protect ourselves against noise? Everyone has asked these questions at one time or another. To answer such questions, we need to find out what noise is and the damage it can do to us. Millions of people today are afflicted with serious hearing loss caused by diseases, infections, injuries, aging *and* excessive noise. Among these causes of hearing loss, excessive noise has become one of the major menaces to hearing.

The human ear for descriptive purposes may be considered as three parts: the external ear, middle ear and inner ear.

The external ear is the visible portion of the ear which ends at the eardrum. Sound waves are collected from the surrounding atmosphere and directed inward toward the eardrum, causing the tympanic membrane to vibrate.

The middle ear has three small bones or ossicles, the malleus, incus and stapes, which link the eardrum to the inner ear and mechanically carry sound to the hearing receptors.

The third component, the inner ear, consists of an auditory part and a vestibular part involved in balance. The auditory portion, the cochlea, is comprised of a fluid-filled chamber where hair-like receptors for hearing are situated. The hair cells detect fluid movement and transmit electrical impulses to the brain where sound is interpreted.

Noise can be defined as a sound which is unwanted and may be loud and unpleasant. It is measured in three ways: intensity, duration and composition (the frequency spectrum of the noise you are hearing). For auditory measurement it is

convenient to convert the physical measurement of intensity to a logarithmic unit known as the dBSPL (decibel sound pressure level). A measure of 120 dBSPL may cause discomfort; 140 dBSPL will cause pain in the average ear; and anything above 160 dBSPL may result in physical damage in the ear. Figure 1 shows the decibel level of everyday sounds.

FIGURE 1: Noise levels of some familiar sounds

Hearing loss cannot only be a function of intensity (dB) but also of duration of sound (how long the ear is exposed to the noise). Steady noise, for a period of time, can cause as much damage as a loud impulse noise. The Surgeon General of the Army has established 85 dBA (sound weighting used in military and industrial standards) as the maximum permissible steady-state noise level for continuous exposure. Figure 2 shows the relationship between maximum sound level and exposure duration in hours.

Loud excessive noise not only affects hearing but also it creates safety hazards, annoyance and inefficiency. In an extra-noisy environment, one may not be able to hear a warning signal or other critical communication. Noise will cause stress and fatigue or distract one's attention from a demanding or difficult task.

Severe noise can also produce nausea and annoying ringing in the ears which continues after the noise has ceased. For instance, military troops who are transported in a helicopter without proper hearing protection might have a ringing or buzzing in their ears after departing the aircraft. This distraction could result in failing to hear or in misunderstanding a squad leader's command.

To most individuals the initial hearing loss goes unnoticed since it does not include many of the frequencies required for understanding speech. By the time a person experiences difficulty in understanding conversation, hearing has been seriously impaired.

Exposure duration per day in hours	Maximum decibels (dBA)
8	85
6	87
4	90
3	92
2	95
1½	97
1	100
½	105
¼ or less	110 (ceiling)

FIGURE 2: Maximum recommended sound level exposure to steady noise measured in decibels

Hearing loss is the number one health hazard in the Army. But what of our civilian counterparts in industry? What are they doing about this noise pollution? During the past few years industry, primarily because of high insurance rates, has taken a great deal of interest in the problem. Some of the methods that can be employed to lessen the hazards of noise are to produce quieter machines. Maintenance and repair of equipment for quieter operation and better operating methods help to reduce noise. The use of noise dampers, mufflers, pads, acoustical tile and carpet, along with sound barriers, walls, shields and remote control booths between workers and the noise source reduce the decibel levels. In addition, a supervisor can reschedule work for shorter exposure and arrange for quieter working hours by scheduling certain tasks to be done at different times, if possible, to avoid a collective noise.

Noise, in the aviation field, is one of the big problem areas for the military. The overall noise levels in Army aircraft generally exceed 100 dBA as shown in figure 3. Note that all of the ranges surpass the Surgeon General's 85 dBA maximum permissible steady-state noise level for continuous exposure.

AIRCRAFT	DECIBELS (dBA)*
AH-1	90-100
UH-1	92-98
OH-6	94-100
OH-58	90-101
CH-47	105-110
CH-54	98-105
OV-1	100-110
U-21	80-102

*Measured at pilot's position

FIGURE 3: Approximate sound levels of selected U.S. Army aircraft

To aid in preventing noise-induced hearing loss, the Department of the Army (DA) has a massive program under way concerning noise and hearing conservation which applies to military as well as DA civilians. DA Circular 40-9 states that all unit commanders are responsible for organizing effective conservation programs with the assistance of their medical staffs and must "stress the use and capabilities of protective hearing devices."

To comply with the hearing conservation directive, all crewmembers and ground crews should be equipped with some form of hearing protection. Hearing protectors are of two general types: those which are inserted into the ear canal (earplugs) and larger usually more efficient types which are worn over the ears (headsets, earmuffs or SPH-4 helmets). Wearing earplugs and earmuffs in combination can provide slightly more protection than either device worn alone. Such a combination is only recommended when noise levels are such that additional attenuation is required. Virtually all noise-induced hearing damage is preventable if these devices are fitted properly and worn regularly. In addition, if hearing is already impaired to some extent, these devices will aid in preventing further damage.

In the aviation community, the dangers of noise to the human ear are widespread and the damage that can be done is irreversible. It is the responsibility of the Department of Defense, industry and all supervisors to ensure that all their workers have the necessary equipment to protect themselves against this enemy. However, adult individuals are responsible to protect themselves, to learn about noise hazards and to wear hearing protection that is available.

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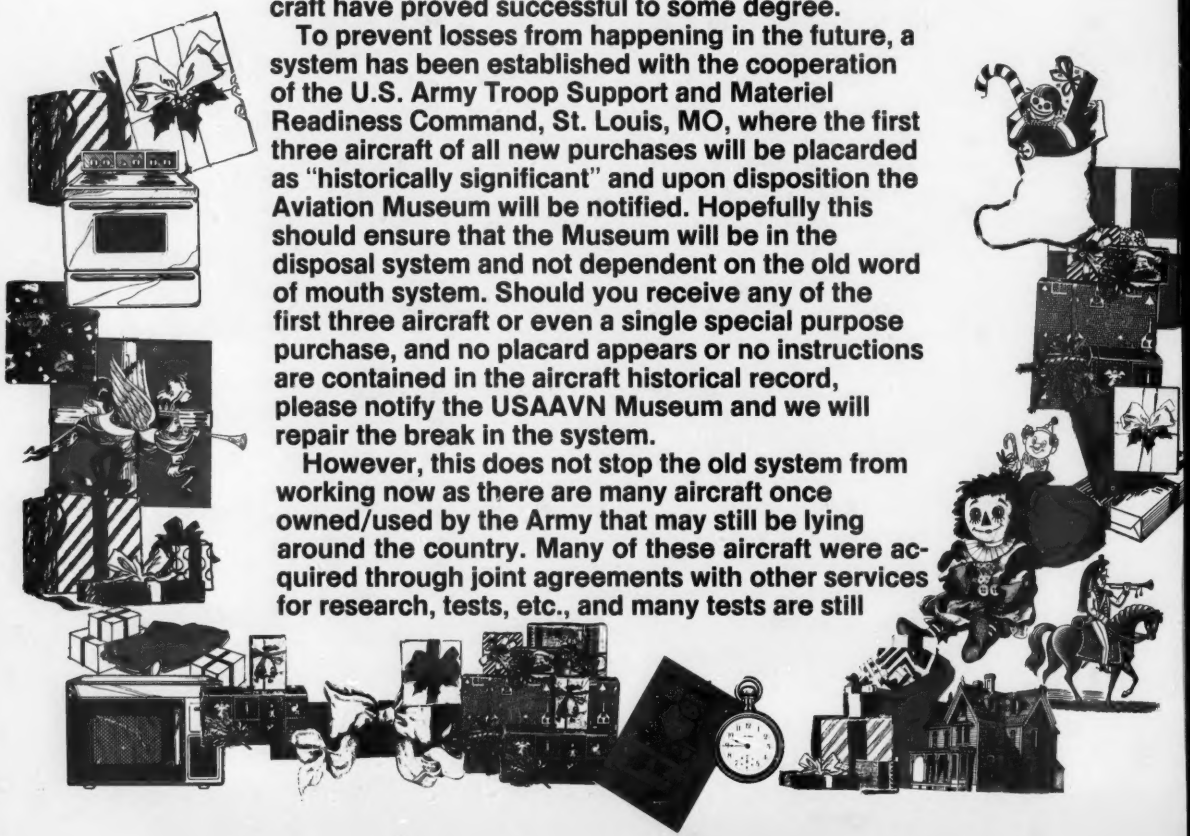
Christmas Want List

UNTIL NOW THE U.S. Army Aviation (USAAVN) Museum at Ft. Rucker, AL, has depended on "word of mouth," rumors and leads throughout the world to keep them aware of the location(s) of possible historic aircraft. With a certain amount of luck, finds have been made and arrangements to save the aircraft have proved successful to some degree.

To prevent losses from happening in the future, a system has been established with the cooperation of the U.S. Army Troop Support and Materiel Readiness Command, St. Louis, MO, where the first three aircraft of all new purchases will be placarded as "historically significant" and upon disposition the Aviation Museum will be notified. Hopefully this should ensure that the Museum will be in the disposal system and not dependent on the old word of mouth system. Should you receive any of the first three aircraft or even a single special purpose purchase, and no placard appears or no instructions are contained in the aircraft historical record, please notify the USAAVN Museum and we will repair the break in the system.

However, this does not stop the old system from working now as there are many aircraft once owned/used by the Army that may still be lying around the country. Many of these aircraft were acquired through joint agreements with other services for research, tests, etc., and many tests are still



underway. But what happened to the aircraft when the experiments were finished? Or what became of the aircraft when they were no longer needed by the Army? It is these aircraft that must be hunted, found and saved so the Museum may tell a complete educational story of Army Aviation history to both the military and the public.

Accompanying this article is a list of wanted aircraft by the USAAVN Museum and if you have any information that would lead to finding these lost aircraft, the Museum would like to hear from you. Please write: U.S. Army Aviation Museum, P.O. Box H, Ft. Rucker, AL 36362; or call commercial 205-255-4507/4516 or AUTOVON 558-4507/4516.

ARMY DESIGNATION POPULAR NAME	MANUFACTURER
GEM Aircar or Ground Effect Machine	Curtiss-Wright
VZ-9A Avrocar	AVRO (Canada)
CV-7A Buffalo	de Haviland (Canada)
HO-1 Djinn	Sud Aviation of Paris
XV-8A Fleep	Ryan
GEM Ground Effect Machine	Princeton University
**XV-6A Harrier	Hawker-Siddley (V. 1127)
XV-9A Hotcycle	Hughes
XV-5A Vertiplane	Ryan
VZ-1E Pawnee	Hiller
HZ-1DE	Delackner
VZ-2PH	Vertol
VZ-4DA	Doak
VZ-5FA	Fairchild
VZ-6CH Aerial Jeep	Chrysler
VZ-8PB Aerial Jeep	Piasecki
X-14	Bell Aerosystems
X-19	Curtiss-Wright
X-22A	Bell Aerosystems
XC-142	LTV-Ryan-Hiller
L-2	Taylorcraft
L-3	Aeronca
L-6	Interstate

ARMY DESIGNATION POPULAR NAME	MANUFACTURER
L-14	Piper
**L-15	Boeing
R-1	Platt-LePage
R-2 (C) Autogyro	Kellett
R-3 (B) Autogyro	Kellett
R-5	Sikorsky
R-6	Sikorsky
R-8	Kellett
R-9	G&A Aircraft—Firestone
R-10	Kellett
R-12	Bell
XH-15	Bell
XH-20	McDonnell
H-24	Seibel
H-31	Doman
H-46 (1)	Boeing
HOK-1	Kaman
UH-2	Kaman (Compound)
VCH-3	Sikorsky
YUH-1B	Bell (Compound)
*XH-59A	Sikorsky (ABC)
*XV-15	Bell
*RSRA	Sikorsky
16H-1C Pathfinder	Piasecki
CG-4A Troop Glider	WACO
*XV-11A MARVEL	Mississippi State University

*Currently being used **One located

U.S. Army Communications Command
ATC ACTION LINE

Instrument Approach Procedures

HOW MANY TIMES have you submitted changes to frequencies, sketches and other type data for instrument approach procedures (IAPs) and later found that the changes were never made on the procedure? However, you did find the correction in the En Route Supplement. In the interest of cost effectiveness, many corrections to IAPs are held in abeyance until the procedure is corrected for some other reason. Check your supplement for current data on frequencies, runway conditions, etc. Listed below are the revision criteria that are needed to determine whether or not a military procedure will be changed and placed in the Military Aviation Notice.

1. Procedure canceled.
2. Procedure identification.
3. Procedure track—bearing modification 2 degrees or more.
4. Change in location of primary or secondary navigational aids (NAVAIDs), fixes or intersections affecting the execution of the procedure.
5. Procedure track—distance, altitude, turns, bearing, alternate route.
6. Glide slope—angle ¼ degrees or more.
7. Operational note/no pt/radar required/caution.
8. Change to the initial, intermediate or final approach fix, distance and/or altitude.
9. Missed approach—point, track, altitude.
10. Changes to or establishment of new terminal routing.
11. Minimum safe altitude—increase or decrease of 100 feet or more.
12. Emergency safe altitude—increase or decrease of 100 feet or more.
13. Minimum—landing, alternate, takeoff.
14. Ceiling, visibility.
15. Threshold crossing height.
16. Holding pattern—realign 2 degrees or more, altitude.
17. Special use airspace, ADIZ (air defense identification zone) or buffer zone.
18. Touchdown zone elevation more than 20 feet.
19. Airport name.
20. Aerodrome (sketch) — A-gear, J-bar.
21. Runway length change ± 500 feet.
22. Deletion of a helicopter alighting area (copter IAPs only).
23. Change to NAVAID name, frequency, channel or identification.
24. Change in name of reporting point, fix or intersection.

If you have submitted a correction that falls into one of the categories listed and we have not updated the IAP, please check with us on its status. Call AUTOVON 284-7984.

We often receive questions concerning why all low altitude IAPs for the conterminous U.S. are not included in Department of Defense (DOD) flight information publications (FLIPs). Maybe the following information will help. Currently, the nine volumes of DOD Low Altitude Instrument Approach Procedures covering the conterminous U.S. include more than 3,000 instrument approach procedures. This does not include the radar IAPs which are listed in the instrument flight rules (IFR) supplement and not charted. All procedures published in the DOD FLIP have been requested by one of the military departments. There are about 3,000 Federal Aviation Administration instrument approach procedures *not* published in the DOD Low Altitude Instrument Approach Procedure books. If these 3,000 procedures were published, they would increase the current size of the instrument approach procedure books by two-thirds. The workload for the NOTAM (notice to airmen) system would increase proportionally. Further, no requirement for these 3,000 procedures has been identified by any of the military departments.

In determining which procedures will be included for airfields with multiple IAPs, we usually publish those procedures which provide best minima, e.g., ILS (instrument landing system) procedures that take advantage of the prevailing winds or runway lengths. Airfields depicted in blue symbology on En Route Low Altitude—U.S. Charts have an instrument procedure capability. Those depicted in dark blue are provided in DOD FLIP. Some of these may be radar procedures with minima only published in the IFR supplement. Army Aviation activities requiring an instrument approach procedure that is not published in the DOD FLIP should justify that requirement to the USAATCA Aeronautical Services Office.

Readers are encouraged to address matters concerning air traffic control to:

Director
USAATCA Aeronautical Services Office
Cameron Station
Alexandria, VA 22314

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